Appendices for Copper Range's Response to USEPA's April 28, 2009 "Supplemental Request for Information Pursuant to Section 104(e) of CERCLA for the Ore Knob Mine Superfund Site, Laurel Springs, Ashe County, North Carolina"

1. Amended Applications for Certificate of Authority to Transact Business in Michigan.
2. "Copper Smelting and Refining Practice at White Pine."
3. Copper Range Company's 1962 Annual Report.
4. "Fifty Years on the South Range."
5. "Copper Range Company."
6. Agreement of Merger between C.G. Hussey & Copper Range Company, dated November 24, 1936.
7. Copper Range Company's 1951 Annual Report.
8. Copper Range Company's 1956 Annual Report.
9. Copper Range Company's 1968 Annual Report.
10. Copper Range Company's 1971 Annual Report.
11. Certificate of Merger of LL&E Delaware, A Delaware Corporation, Into Copper Range Company, A Michigan Corporation, filed May 24, 1977, and an Agreement of Merger, dated April 21, 1977.
12. Certificate of Merger of Copper Range Company and C.G. Hussey & Company, Inc.; Champion Copper Company; Saint Mary's Canal Mineral Land Company; Copper Range Exploration Company, Inc.; Contemporary Research, Inc.; and White Pine Copper Company, dated December 22, 1977.
13. Certificate of Merger of Copper Range Company and Smoky Valley Mining Company, filed December 29, 1978.
14. Certificate of Dissolution for Copper Range Railroad Company, dated December 28, 1979.
15. Share Sale and Purchase Agreement between Echo Bay, Inc., Northern Copper Corporation and Copper Range Company, dated October 1, 1985.
16. Silver Agreement between Echo Bay Inc., Northern Copper Corporation and Copper Range Company (a Michigan corporation), dated October 1, 1985.

17. Agreement and Plan of Merger between Northern Copper Corporation and Copper Range Company (a Delaware corporation), dated November 7, 1985.

18. Agreement and Plan of Merger between Copper Range Company (a Delaware corporation) and Copper Range Company (a Michigan corporation), dated November 7, 1985.

19. Certificate of Merger of CRC Acquisition Company Into Copper Range Company.

20. Agreement And Plan Of Merger between Copper Range Company, Metall Mining Corporation, MMC Holdings Inc. and CRC Acquisition Company, dated April 25, 1989.

21. Unanimous Written Consent Resolutions Of The Board of Directors of Copper Range.

1

C&S-582 (Rev. 1-84)

8730#6532 0316 ORG&FI $10.00

MICHIGAN DEPARTMENT OF COMMERCE — CORPORATION AND SECURITIES BUREAU

(FOR BUREAU USE ONLY)

FILED

MAR 18 1987

Administrator
MICHIGAN DEPARTMENT OF COMMERCE
Corporation & Securities Bureau

Date Received
MAR 1 6 1987

AMENDED APPLICATION FOR CERTIFICATE OF AUTHORITY TO TRANSACT BUSINESS IN MICHIGAN

For use by Profit Foreign Corporations

(Please read instructions and Paperwork Reduction Act notice on last page)

Pursuant to the provisions of Act 284, Public Acts of 1972, as amended, the undersigned corporation executes the following Amended Application:

1. a. The true name of the corporation as stated in its original, or last amended, Application with this State is:
Copper Range Company

b. If the true name of the corporation has changed, its new name is:
N/A

and the name change was made in compliance with the laws of the jurisdiction of its incorporation.

The effective date of the name change was the ____ day of ____________, 19____.

2. The corporation identification number (CID) assigned by the Bureau is: 625—568

3. It is incorporated under the laws of Delaware

4. The corporation was initially authorized to transact business in Michigan on the 7th day of November, 19 85.

5. The period of its duration (corporate term) is perpetual

6. a. The name under which it has obtained its Certificate of Authority, if other than the true name, is:
N/A

b. If the name under which the Certificate of Authority was obtained has changed, the new name is:
N/A

7. a. The address of the main business or headquarters office of the corporation is:

(Street Address)	(City)	(State)	(ZIP code)
M-64	White Pine	Michigan	49971

b. The mailing address if different than above is:

(Street Address)	(City)	(State)	(ZIP code)
P. O. Box 100	White Pine	Michigan	49971

8. The address of the registered office in Michigan is:

615 Griswold Street, Detroit, Michigan 48226

(Street Address) (City) (ZIP Code)

and the name of the resident agent at the registered office is:

The Corporation Company

The resident agent is an agent of the corporation upon whom process against the corporation may be served.

9. If the business the foreign corporation proposes to do in this State is to be enlarged, limited, or otherwise changed, the specific business which the corporation is to transact in Michigan is as follows:

No change.

The corporation is authorized to transact such business in the jurisdiction of its incorporation.

10. The authorized capital stock of the corporation, if changed, is:

2,000,000 common shares having a par value per share of $ .001

100,000 preferred shares having a par value per share of $ .001

-0- common shares having no par value.

-0- preferred shares having no par value.

The effective date of the stock change was the 4th day of February, 1987.

Signed this 29 day of January, 1987

By [signature]

(Signature)

Michael D. Dunn, Secretary

(Type or Print Name and Title)

CAS-582 (Rev 1-84)

DOCUMENT WILL BE RETURNED TO NAME AND MAILING ADDRESS INDICATED IN THE BOX BELOW. Include name, street and number (or P.O. box), city, state and ZIP code.

Sandra L. Wainer
Parcel, Mauro, Hultin & Spaanstra
1801 California Street, Suite 3600
Denver, CO 80202

Name of person or organization remitting fees:

Parcel, Mauro, Hultin & Spaanstra

Preparer's name and business telephone number:

Sandra L. Wainer

(303) 292-6400

INFORMATION AND INSTRUCTIONS

1. This form is issued under the authority of Act 284, P.A. of 1972, as amended. The amended application for certificate of authority to transact business cannot be filed until this form, or a comparable document, is submitted.
2. Submit one original copy of this document. Upon filing, a microfilm copy will be prepared for the records of the Corporation and Securities Bureau. The original copy will be returned to the address appearing in the box above as evidence of filing.

   Since this document must be microfilmed, it is important that the filing be legible. Documents with poor black and white contrast, or otherwise illegible, will be rejected.
3. This document must be filed pursuant to section 1021 of the Act by foreign profit corporations having a certificate of authority to transact business in this State where the information contained in its original or last amended application has changed. This amended application must be filed no later than 30 days after the time the change becomes effective in the jurisdiction of its incorporation.
4. Item 2 — Enter the identification number previously assigned by the Bureau. If this number is unknown, leave it blank.
5. Item 9 — This item should state only the specific activities or affairs to be conducted in Michigan. An all purpose activities statement is not permitted.
6. This amended application must be signed in ink by an authorized officer or agent of the corporation.
7. FEES: Filing fee (Make remittance payable to State of Michigan) $10.00
8. Mail form and fee to:

   Michigan Department of Commerce
   Corporation and Securities Bureau
   Corporation Division
   P.O. Box 30054
   Lansing, Michigan 48909
   Telephone: (517) ~~373-0493~~
   334-6302

934E#0492 0125 ORG&FI $10.00
C&S-562 (3/92) 934E#0481 0125 ORG&FI $10.00

MICHIGAN DEPARTMENT OF COMMERCE – CORPORATION AND SECURITIES BUREAU

Date Received		(FOR BUREAU USE ONLY)
JAN 2 5 1993		Adjs. made within this document were made pursuant to telephone authorization from M. Fleury for Item10.

FILED

FEB 18 1993

Administrator
MICHIGAN DEPARTMENT OF COMMERCE
Corporation & Securities Bureau

Name
Copper Range Company
Address
P.O. Box 100
City: White Pine State: MI Zip Code: 49971

EFFECTIVE DATE:

DOCUMENT WILL BE RETURNED TO NAME AND ADDRESS INDICATED ABOVE

AMENDED APPLICATION FOR CERTIFICATE OF AUTHORITY TO TRANSACT BUSINESS IN MICHIGAN

For use by Profit Foreign Corporations
(Please read information and instructions on reverse side)

Pursuant to the provisions of Act 284, Public Acts of 1972, (profit corporations), the undersigned corporation executes the following Amended Application:

1. a. The true name of the corporation as stated in its original, or last amended, Application with this State is:
Copper Range Company
b. If the true name of the corporation has changed, its new name is:

and the name change was made in compliance with the laws of the jurisdiction of its incorporation.

The effective date of the name change was the ______ day of ______________________________, 19 ______

c. (Complete this item only if the new corporate name in item 1b is not available for use in Michigan)
The assumed name of the corporation to be used in all its dealings with the Bureau and in the transaction of its business or the conduct of its affairs in Michigan is:

2. The identification number assigned by the Bureau is: 6 2 5 – 5 6 8

3. It is incorporated under the laws of Delaware

4. The corporation was initially authorized to transact business in Michigan on the 7th day of November, 19 85.

5. The period of its duration (corporate term) is Perpetual

6. a. The qualifying name filed when the corporation obtained the original Certificate of Authority:
Copper Range Company

b. If the qualifying name has changed, the new name is: ______________________________

fr

7. a. The address of the main business or headquarters office of the corporation is:

(STREET ADDRESS)	(CITY)	(STATE)	(ZIP CODE)
1 Wilcox Road	White Pine	MI	49971

b. The mailing address if different than above is:

(STREET ADDRESS)	(CITY)	(STATE)	(ZIP CODE)
P.O. Box 100	White Pine	MI	49971

8. The address of the registered office in Michigan is:

615 Griswold ~~1 Wilcox Road~~ (STREET ADDRESS), Detroit ~~White Pine~~ (CITY), Michigan 48226 ~~49971~~ (ZIP CODE)

and the name of the resident agent at the registered office is: The Corporation Company
615 Griswold
Detroit, MI 48226

The resident agent is an agent of the corporation upon whom process against the corporation may be served.

9. If the business the foreign corporation proposes to do in this State is to be enlarged, limited, or otherwise changed, the **specific** business which the corporation is to transact in Michigan is as follows:

Mining, Milling, Smelting, Refining

The corporation is authorized to transact such business in the jurisdiction of its incorporation.

10. The total authorized shares of the corporation:

Common Shares 40,000,000.000

Common ~~Preferred~~ Shares 10,000,000.000

The effective date of the stock change was the ____ day of April, 19 89

Signed this 12th day of January, 19 93.

By [signature] (SIGNATURE)

Michael J. Fleury, Controller
(TYPE OR PRINT NAME AND TITLE)

C&S-562 (3/92)

MICHIGAN DEPARTMENT OF COMMERCE – CORPORATION AND SECURITIES BUREAU

Date Received MAY 21 1993		(FOR BUREAU USE ONLY)
		FILED MAY 28 1993 Administrator MICHIGAN DEPARTMENT OF COMMERCE Corporation & Securities Bureau

Name		
Copper Range Company		
Address		
P.O. Box 100		
City: White Pine	State: MI	Zip Code: 49971

EFFECTIVE DATE:

DOCUMENT WILL BE RETURNED TO NAME AND ADDRESS INDICATED ABOVE

AMENDED APPLICATION FOR CERTIFICATE OF AUTHORITY TO TRANSACT BUSINESS IN MICHIGAN

For use by Profit Foreign Corporations

(Please read information and instructions on reverse side)

Pursuant to the provisions of Act 284, Public Acts of 1972, (profit corporations), the undersigned corporation executes the following Amended Application:

1. a. The true name of the corporation as stated in its original, or last amended, Application with this State is:

   Copper Range Company

   b. If the true name of the corporation has changed, its new name is:

   and the name change was made in compliance with the laws of the jurisdiction of its incorporation.

   The effective date of the name change was the ______ day of ______________________, 19 ______

   c. (Complete this item only if the new corporate name in item 1b is not available for use in Michigan)
   The assumed name of the corporation to be used in all its dealings with the Bureau and in the transaction of its business or the conduct of its affairs in Michigan is:

2. The identification number assigned by the Bureau is: 625 – 568

3. It is incorporated under the laws of Delaware

4. The corporation was initially authorized to transact business in Michigan on the 7th day of November, 19 85.

5. The period of its duration (corporate term) is Perpetual

6. a. The qualifying name filed when the corporation obtained the original Certificate of Authority:

   ____

   b. If the qualifying name has changed, the new name is: ______________________

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7. a. The address of the main business or headquarters office of the corporation is:

1 Wilcox Road	White Pine	MI	49971
(STREET ADDRESS	(CITY)	(STATE)	(ZIP CODE)

b. The mailing address if different than above is:

P.O. Box 100	White Pine	MI	49971
(STREET ADDRESS	(CITY)	(STATE)	(ZIP CODE)

8. The address of the registered office in Michigan is:

30600 Telegraph Road, (STREET ADDRESS) Bingham Farms (CITY), Michigan 48025 (ZIP CODE)

and the name of the resident agent at the registered office is: The Corporation Company

The resident agent is an agent of the corporation upon whom process against the corporation may be served.

9. If the business the foreign corporation proposes to do in this State is to be enlarged, limited, or otherwise changed, the **specific** business which the corporation is to transact in Michigan is as follows:

Mining, Milling, Smelting, Refining

The corporation is authorized to transact such business in the jurisdiction of its incorporation.

10. The total authorized shares of the corporation:

Common Shares 2,500,000

Common Class A ~~Preferred~~ Shares 500,000

The effective date of the stock change was the ______ day of April, 19 89

Signed this 18th day of May, 19 93.

By [signature]
(SIGNATURE)

Michael J. Fleury, Controller
(TYPE OR PRINT NAME AND TITLE)

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1962

COPPER SMELTING AND REFINING PRACTICE AT WHITE PINE

Introduction

The White Pine Copper Company is a wholly owned subsidiary of the Copper Range Company which has operated in the Michigan copper district since 1899. It was set up in 1952 at the time of the Korean Crisis. Smelter production began in January of 1955. Current monthly production is 9,500,000 pounds of fired refined copper in various shapes and 600,000 pounds of high silver ingots for electrolytic refining. The principle source of copper for the smelter comes from the milling operation here at White Pine as a flotation concentrate or high silver concentrate. This accounts for 90 per cent of the smelter's copper production. About 5 per cent of the copper comes from the Champion Mine at Painesdale. This is processed at the Freda mill and comes to us either as a flotation, jig, or table concentrate or as mass copper. The remaining 5 per cent comes from the Ore Knob mine near Jefferson, North Carolina. In July of 1962, Copper Range Company purchased all the stock of this mine. Actually the ore at this site is about exhausted, but Copper Range has begun intensive exploration to find extensions of the orebody. We have been receiving a chalco-pyrite concentrate from this operation for almost two years. Our present level of operation requires a force of 162 employees. In keeping with company practice, an active safety program headed by supervisory personnel is maintained. This program calls for monthly meetings for discussion of safety matters. Safety glasses, hard hats, and other safety equipment is provided by the company. Employees may purchase safety shoes through the company. Recently 100% of the smelter's supervisory staff completed the Bureau of Mines course in first-aid methods.

Sampling and Handling of Concentrates and Fluxes

All sampling of White Pine concentrates is handled by the mill department and assays reported to the smelter daily. Flotation concentrate runs 30 per cent copper and 16 per cent moisture. Silver concentrate runs 68 per cent copper and 120 ounces per ton of silver. Freda products are shipped by truck and a grab sample is taken from each truck load. Chalco-pyrite from Ore Knob presents a difficult sampling job. This material arrives in box cars and carries about 10 per cent moisture and at times is set so hard that conventional tube type sampling is impossible. A representative sample is taken by driving holes into the material with a 2 inch pipe and jack hammer. A moisture sample is thieved from the sample and the remaining material is put through a 10 mesh screen and then coned and quartered for an assay sample. Pyrite and limestone fluxes are sampled as they are used from storage silos. Impurities in the concentrate are largely silica, alumina and iron. These impurities are not readily fuseable and would be difficult to remove from the furnace; therefore, limestone is added to form an iron calcium silicate slag containing alumina and other oxides which fuses at a lower temperature and is readily removed from the furnace at temperatures that can be reached with coal firing. Because our copper mineral is chalcocite and native copper, sulphur is added in the form of pyrite and chalco-pyrite to maintain a satisfactory grade of matte. These fluxes are stored in silos and added to the concentrate as it leaves the filter. Automatic regulators control flux feeders and compensate for variations in filter output. After the addition of flux the charge passes through a pug mill and then into the bedding building where it is either stored in two 100 ton silos or stockpiled on the floor. High silver concentrate is trucked to the bedding building to accumulate for usually about two months. It is then fluxed and charged to the reverberatory furnace. Freda products are trucked directly to the bedding building where they are fluxed with pyrite and stored until needed, except for the mass copper which is charged directly to the converters. The reverberatory furnace is charged from the bedding building once every hour by means of conveyor belts and a tripper car that spans the furnace and travels its length on tracks.

Reverberatory Smelting

The fluxed charge is fed into a reverberatory smelting furnace. This furnace consists of a long shallow hearth provided with side and end walls and arch. At White Pine we have one reverberatory furnace. It has a Detrick flat suspended arch and Detrick sectionally supported walls. Reverb dimensions are 110 feet long by 28 feet wide inside and 9 feet from the top of the molten bath to the arch. An overall bath depth of 56 inches is normally carried. The furnace bottom was built up with 6 feet of select aggregate, 4 feet of concrete covered by a 6 inch layer of pumice concrete, and topped by a 6 foot layer of fused smelter reverb slag shipped in from a Southwest smelter. After the reverb slag was charged to the reverb by the normal charging system and leveled off, the furnace was fired to smelting temperature and more slag added until the molten bottom was complete. The bottom was then allowed to cool. The furnace bottom is enclosed by huge concrete blocks tied together by two massive steel girdles running the length of the furnace and tie rods running through the concrete bottom tying the side walls together. These latter tie rods were added at a later date after it was noted that some shifting had taken place in the concrete blocks.

The furnace arch uses a 15 inch chemically bonded magnesite-chrome Detrick shape brick. Each brick in the arch is individually supported by hangers. A complete arch requires 27,376 bricks and 13,688 hangers. The arch is not sprayed as silica type arches are to prolong their life. Instead as the brick get thin or a section of the arch drops in, the bad spot is repaired by hanging new brick. This can be done under normal operating conditions without loss of smelting capacity, unless the holes are large. In this case, it may be necessary to reduce the firing rate to expedite the repair. By keeping the arch clean, cooling it with fans and hot patching, the usual life of the reverberatory has been prolonged. Campaigns now extend to as long as an 18 month period.

The walls, supported by heavy iron brickstaves, are 18 inches thick. They are built largely of silica brick. The lower two thirds of the walls along the charging zone are lined on the inside with burned chrome magnesite brick. Occasionally it is necessary to make hot patches and replace portions of the brick in the sidewalls. The furnace crucible is constructed of burned chrome magnesite brick to a height of about 12 inches above the normal matte line and varies from 5 feet thick at the bottom to 3 feet thick at the top. Crucible repairs can be made only during shutdown except for minor maintainance at tap holes. Copper water jackets are installed around the four burner ports at the firing wall and around the slag holes in the side walls.

The furnace is equipped with 4 burners designed to use pulverized coal. Burner tips are water cooled and fabricated at the smelter. Several sizes and combinations of sizes have been tried for maximum smelting. The present tips all have 24 inch by 10 inch openings. Present smelting requirements call for 186 tons of bituminous coal per day rated at 14,000 B. T. U's. per pound. Pulverized coal is supplied to the burners by three Babcox and Wilcox Ball Race pulverizers powered by 60 h.p. motors. A direct hook-up is provided between pulverizers and burners by 12 inch pipes so arranged that pulverizers can be switched to different distribution arrangements. Primary air supplied by 3 blowers at 34 inches of water pressure and automatically controlled to maintain a pulverizer discharge temperature of 150 degrees Fahrenheit, conveys the coal directly to the burners. This eliminates storage of pulverized coal which has been pulverized to over 80 per cent minus 200 mesh. 70 per cent of combustion air is supplied by three secondary air blowers at 13 inches of water pressure and preheated to 350 degrees Fahrenheit. Air and coal flows are either manually or automatically controlled with indicating control instrumentation. Hourly assays are made of combustion gases with a Burrell flue gas analyser.

At White Pine, the first step in treating the charge is smelting. The purpose of the smelting process is to separate the metal sulphides in the mill concentrate from the gangue and this is achieved by smelting with suitable fluxes at about 2400 degrees Fahrenheit. The fluxed concentrates are charged along the walls of the furnace forming charge piles on each side of the central molten bath of matte and slag. The charge is fed into the reverberatory smelting furnace by means of feed hoppers set in the roof. The charging zone extends about two thirds down the length of the furnace. The smelting action in the furnace is essentially a simple melting operation. The fuel is burned with the correct amount of air so that the maximum temperature is produced and the resulting flame is practically neutral. The flame extends through the space below the arch and above the charge, and the charge is heated by radiation from the flame and hot gasses in this space. As the charge fuses, the sulphides collect as a molten matte and the slag forming oxides form the slag. These two liquids are immigcible and form two liquid layers on the furnace crucible. As new charge is added and as it fuses into the bath the volume of molten matte and slag increases. Slag is skimmed intermittently from one of two slag notches located in the sides of the furnace at the flue end. The slag is essentially an iron calcium silicate containing alumina and small amounts of other oxides. A typical slag assay is 0.6 per cent copper, 48 per cent silica, 14 per cent alumina, 15 per cent iron and 17 per cent lime. The slag hole is opened with an oxygen lance or simply with an iron bar if it has not been plugged very long. Clay dobies are used to plug the hole. Slag is tapped over cast iron launders into 225 cu. ft. pots, which are hauled to the slag dump with a 25 ton diesel electric locomotive in trains of two pots. The slag pots are dumped by remote control from the locomotive cab. This feature eliminates the hazard of slag splashing back on an operator while dumping the slag. Cooled slag is pushed away from the track by tractor or the track is relocated as necessary. Matte is tapped intermittently from lower tap holes as it is required, and transferred molten to the converter. There are two matte holes on either side of the furnace. One matte hole on each side being at a lower level than the other. Matte holes are opened with oxygen and plugged with clay as at the slag hole. The matte consists basically of a solution of cuprous and ferrous sulphides, together with the silver in the original charge. The copper content of reverberatory matte is normally 65 per cent. Small variations occur because of inconsistancy in concentrates and fluxes, but this never amounts to much more than one or two per cent. Matte is tapped over cast iron launders lined with clay and sand into 175 cu. ft. ladles resting in the matte tunnel, under fume hoods, on small electrically driven cars. The present charging rate is over 900 tons per furnace day. Up until recently this has proven satisfactorily to handle the concentrates received, but improved mine production has been crowding us lately, so that future plans call for drying the mill concentrate below 16 per cent moisture, after it leaves the filters, in order to increase smelting capacity. During a reverberatory campaign, smelting continues 24 hours a day the year round except for holidays when the fires are cut so that no smelting occurs, but the furnace is not allowed to cool. At the end of the furnace campaign, it normally takes 10 to 12 days to rebuild the furnace.

Waste Heat Boiler and Power Plant

The combustion gases from the reverberatory furnace pass through a Babcox and Wilcox water tube boiler designed to produce steam at 885 p.s.i. and 900 degrees Fahrenheit at the superheater outlet. Normal steam production is 90,000 pounds per hour with a heat recovery representing approximately 50 per cent of the furnace fuel input. Flue gas temperature at the boiler outlet averages 900 degrees Fahrenheit. Besides protecting the stack from excessive temperatures, this boiler supplies almost one third of the steam requirements for electrical generation. Automatically controlled soot blowers, using steam at 200 p.s.i. do a fairly good job of keeping the boiler clean. However, some hand-lancing is required daily. Normally all furnace gases pass through the waste heat boiler. However, in case of boiler failure, a by-pass flue will permit continuous smelting but at a reduction of about 40 per cent. The boiler and by-pass flue each have a water cooled shut-off damper in front of them. All power requirements with the exception of the townsite's are generated in the company's power station. Peak load is 28,000 kw. Two power boilers located in the power house generate the remaining steam requirements for electrical generation. An additional boiler supplies heating steam. Power is generated by three hydrogen cooled turbo-generators rated at 17,200 kw. each. After leaving the waste heat boiler, combustion gases pass through the draft control dampers, balloon flue, a four unit cotrell electrostatic precipitator, and finally to the 504 ft. reinforced concrete chimney. The primary purpose of the high stack is to diffuse the smoke farther from the earth. Actually, the friction loss becomes so great after the stack exceeds 150 feet in height that little additional head is gained. Originally, the flue system did not have a precipitator but dust loss figures soon showed that such a unit warranted installation. 95 per cent of the flue dust is now collected and returned to the reverberatory furnace. This dust assays over 20 per cent copper. A vacuum system collects the dust from the flue system and discharges it into a sealed tank located inside the smelter building. This tank is connected to the reverb charge system through a screw feeder and Hapman tubular conveyor. A small quantity of dust is added to the moist charge during each charging period. By adding the dust to the charge at a conveyor belt transfer point, fairly good mixing is accomplished, thereby keeping dusting low.

Converter Department

Arranged at right angles to the reverb.furnace on the opposite side of a 50 foot wide converter aisle are two 13 by 30 foot standard Pierce-Smith converters. These units are lined with hard burned chrome-magnesite brick. The tuyere line consists of 42 tuyere pipes set in 18 inch tuyere brick. Converters are serviced by two bridge- type cranes. These cranes also service the casting furnaces. Cranes use D. C. power and have two hoists each with a capacity of 60 tons. Crane cabs are completely enclosed and air conditioned. The converting operation consists essentially of blowing air through the molten matte from the reverberatory furnace. No fuels are necessary, all the heat is provided by the reactions, taking place. Converting is a two-stage, batch process. In the first stage, or so-called slag blow, a portion of the sulphur in the matte is eliminated. At the same time the iron oxidizes, combines with the silicious fluxes, and is poured off as slag. During the slag blow, matte and fluxes are added and slag removed at intermittent periods until the equivalent of about 70 tons of copper is contained. After the last skim of the slag blow, converting advances to the second stage or finish blow. The remaining bath consists of white metal, a copper sulphide. With continued blowing, the sulphur oxidizes and blister copper results which assays 99 per cent copper. The end of the finish blow is detected by the operator by inserting a sample rod into the bath through a tuyere and noting the appearance of the solidified copper on the rod. To put a converter in blowing position, the blast of air is first turned on and the converter rotated until the tuyeres are covered. Tuyeres are kept open by hand punching. A major change in smelter operation in the fall of 1957 resulted in an ideal supply of converter flux. At that time it was decided to decrease the amount of pyrite flux to the mill concentrate, thereby increasing the matte grade to 65 per cent copper. This made possible the use of molten reverberatory slag as flux for the converters. Slag from the converter is returned to the reverberatory furnace over a water cooled launder mounted in the firing wall above the burners. Converter gases discharge from the hoods to a balloon flue, then exhausts from the same chimney as the reverb gases. Air is furnished by two 28,000 C.F./M. turbo blowers driven by 2000 h.p. synchronous motors. These units are arranged so that any blower can supply air to any converter. Only one blow and one converter is ever used at a time. Converter air is supplied at 14 p.s.i. The most feared occurrence in converter operation is the failure of either air or power sources. Sudden air failures may cause tuyeres to be filled with molten material, and a power failure would release the brakes locking the converter in position. Either occurrence may result in operating delay. Generally there is sufficient forewarning of air failures to permit turning converters out of the blowing position before any damage is caused. Power failures are usually sudden and unpredictable. To reduce this hazard, an alarm sounds when power is lost to the D. C. generator. This gives two to three minutes warning before D.C. power is lost.

Copper Refining and Casting

From the converters, the blister copper is charged into one of two oil fired refining furnaces for final purification. Present casting rate requires a six day casting schedule, each furnace being used on alternate days, Monday through Saturday. Furnaces are lined with burned basic brick. Capacities vary from 180 tons in the smaller furnace to 250 tons in the larger. Fire refining is the last step in producing a product which exceeds 99.9 per cent copper. Nature was good when she created the White Pine orebody. From a refiner's view, White Pine's copper impurities are so low that our metallurgical methods can produce a fire-refined copper of excellent quality without electrolytic refinement. After the charging of the blister copper to the refining furnaces, the impurities are oxidized by blowing compressed air into the bath through iron pipes. Under this oxidizing action, impurities are oxidized and rise to the surface to form a viscous slag which is skimmed from the bath as it forms. Some soda ash is blown into the bath to aid in the removal of arsenic. Oxidation is continued until the bath is saturated with copper oxide. The presence of so much of this brittle compound in the copper makes it necessary to pole the copper to reduce the copper oxide back to metallic copper. Long green hardwood poles are inserted into the bath. As the heat decomposes the wood, the reducing gases formed react with the copper oxide and reduces it to metallic copper. Poling is continued until the copper has the desired set on the sample block. From the refining furnace the copper flows through a tapping slot in the side of the furnace over launders to the casting ladle. This ladle is mounted over a Walker type casting wheel and can be tilted to pour the molten copper into molds on the wheel. This wheel can accomodate from 14 horizontal molds to 56 vertical molds. Casting rate is usually about 40 tons per hour. Several different mold shapes are used and can be changed on the wheel as required. Molds are made of copper and their inner surfaces are sprayed with bone ash to prevent the molten copper from sticking to them. As the wheel rotates, the copper is dumped into a bosch pit from where it is conveyed past inspectors, weighed and finally loaded into box cars. White Pine copper contains enough uniformly distributed silver and is relatively free from harmful impurities, so that it has some mechanical properties superior to electrolytic copper.

The smelter operation was started less than ~~seven~~ eight years ago. This year we are adding a new semi-continuous casting system and are planning to increase production by lowering the moisture content of the concentrate. I'd say the future looks bright.

3

C E Ensign

COPPER RANGE COMPANY

1962

ANNUAL REPORT

COPPER RANGE COMPANY

Established 1899

630 Fifth Avenue, New York 20, New York

To the Shareholders:

You who have invested in the mining industry should know that one of the greatest threats to the industry as a whole faces us in Congress within the next few weeks. This is the present form of S. 174, the Wilderness Act, which passed the Senate overwhelmingly last year and is now before the House.

No citizen of the United States doubts that one of our greatest assets is the natural resources for recreation. We all are anxious to see these dwindling resources preserved for posterity. Living in the wilderness as he does, the miner himself is one of its greatest admirers.

Unfortunately, the advocates of wilderness preservation have gone to the extreme in distorting the actual facts of the matter, and the Act, in its present form, would do far more harm than good to the country as a whole. They say that the lands to be included in the Act comprise less than 2 per cent of the land surface of the United States. The facts are that in the eleven western states where most of the lands involved in the Act are located 28 per cent are unfavorable geologically for prospecting. The lands subject to this Act, added to those already withdrawn for many other purposes, comprise over 10 per cent of those which remain in favorable areas. They say that mining is the great despoiler of the wilderness, but they fail to put it into perspective. Although a mine admittedly will disfigure a small area for a brief period of years, after it is worked out nature quickly heals the scars and the area returns to wilderness. Even in the historically mined states of Idaho, Washington and Montana, only .13 per cent of the land area is involved in mining. Mines can exist only where minerals happen to occur; wilderness areas can be preserved at alternate locations and even restored in time.

With the rapidly increasing demand for minerals, we must take advantage of every opportunity to keep the lifeblood of industry going. If we fail to find more mines, the industrial areas of the east will suffer the most.

The preservationists fail to distinguish between prospecting and mining. In order to find mines, the modern prospector must fly and walk his modern tools over vast areas, but at this stage he does nothing to disturb the surface of the land. This Act would effectively prevent not only mining but prospecting. It is only when he actually finds one of these extremely rare occurrences of ore that he needs to disturb a comparatively small area.

We do not ask that the Act be opposed in principle — only that the Congress provide in it the freedom for the prospector to enter these lands and the right to mine the rare discoveries he might make. We urge each of you to bring this problem to the attention of your congressmen. At the moment, Copper Range is not directly affected, so we can speak purely from the standpoint of knowledge, and we are convinced that unless the Act is properly amended, U. S. Industry as a whole will be seriously damaged in the not too distant future.

Sincerely yours,

April 24, 1962

James Boyd.

President

COPPER RANGE
COMPANY

General Offices:
630 Fifth Avenue, New York 20, New York

Sixty-second Annual Report *For the Year Ended December 31, 1962*

CONTENTS

RESULTS AT A GLANCE

(CONSOLIDATED BASIS)

	1962	1961
Net sales	$ 47,767,588	$ 49,922,660
Earnings before federal income taxes	$ 4,349,904	$ 2,657,639
Provision for federal income taxes*	$ 1,050,000	—
Net earnings	$ 3,299,904	$ 2,657,639
Earnings per share	$1.76	$1.42
Capital expenditures	$ 4,446,070	$ 3,139,191
Depreciation, per books	$ 3,353,798	$ 3,338,030
Cash items and U. S. Government securities, at cost	$ 15,444,743	$ 17,472,882
Net working capital	$ 25,138,775	$ 26,470,520
Working capital ratio	6.9 : 1	8.2 : 1
Long-term debt	$ 33,095,731	$ 36,495,731
Stockholders' equity, per books	$ 54,906,985	$ 51,605,514
Book value, per share	$29.25	$27.49
Ore mined (tons)	6,060,389	5,569,000
Copper produced (pounds)	117,484,025	112,881,034
Shares outstanding at year end	1,877,573	1,877,473
Approximate number of shareholders	5,221	5,961
Average number of employees	2,452	2,512

*Federal income taxes were not payable for the year 1961 because of tax losses in prior years. At December 31, 1961, the Company had approximately $1,100,000 tax loss carry-forward which has been applied to taxable income for 1962 in determining the taxes provided above.

COPPER RANGE COMPANY

To the Shareholders and Employees:

Our 1961 annual report revealed that we had overcome a great many of the difficulties that had put us in a loss position in 1960. The results for 1962, listed on the opposite page, amply demonstrate that the progress of such improvements has become increasingly rewarding. The mining activities of your company are no longer of marginal profitability, and White Pine at last has taken its place among the established copper enterprises of the world. These results could not have been achieved without a great deal of concerted effort by our employees, suppliers, consultants, and many others. To all of these people we express our appreciation.

Operations in 1962 resulted in net-after-tax earnings of $3,299,904 compared with $2,657,639 in 1961, but this reflects only a part of the comparative improvement inasmuch as we incurred $1,050,000 in income taxes during 1962 and none in 1961. The cash generated in 1962 was $7,363,000 and current funds in the amount of $3,400,000 were applied to the reduction of the government mortgage loan and $4,446,000 to acquisition of capital replacements and additions. Sinking fund payments on the government loan are prepaid through 1963, and net working capital, while slightly lower than at the end of last year, amounts to $25,138,775. Our financial position, therefore, remains strong.

The reduction in 1962 dollar sales from those of the previous year resulted from three factors:

1. The decline of 5,000,000 pounds in refined copper deliveries. In 1961 we liquidated inventories, while in 1962 deliveries depended solely on production.
2. A reduction in fabricated product prices.
3. The loss of volume in the Hussey Division due to eight weeks of strikes.

JAMES BOYD, *President*

An increase in excess of .6 cents per pound in the average selling price of refined copper over the previous year contributed to the increased earnings. By far the larger part of these additional earnings was the result of improvements in operating costs at White Pine. There were a number of factors contributing to this improvement, the most important of which were the attaining of a higher daily average rate of production; the reduction in dilution of mined ore through careful grade control; the acquisition of a fleet of more efficient, company-designed ore trucks; material improvements in maintenance and availability of equipment; the use of new mining methods; and improved management techniques. Many of these improvements have been steady and gradual throughout the year. Our efforts to lower costs are continuing.

White Pine — Mine Production

Toward the end of 1962 the steady improvement in mine production began to press the capacity of the mill. In the last two months the output of the mill, in turn, exceeded the capacity of the smelter. As mining at White Pine has been the most difficult problem to solve, this development is far from unwelcome. The solution of the mining problem had to be developed from many alternatives — all of which involved highly technical studies. During 1962 the mine was developed ahead of extraction for the first time, and development can now be more readily maintained without the heavy expenditures made for this purpose during the past. Perhaps one of the most important improvements was the achievement of a system of grade control, as a result of which as little waste as possible was sent to the mill. Hence, the increase in tonnage of ore mined was accompanied by a net increase in grade of the mill heads. During 1962 all but four of the ore trucks or shuttle cars developed in 1961 were delivered and put into service. These cars, together with improved mine layout which has shortened the distance for hauling the ore, have reduced the haulage costs, and this type of improvement will continue.

White Pine — Mill and Smelter

Until the latter part of 1962, the mill and smelter suffered from the lack of ore. Now that their present capacities have been reached, it has become necessary to make modifications to rectify this imbalance. Two new rod mills (ore grinding facilities) are being added to the last section of the mill. These are expected to increase the mill capacity by almost 10 per cent by March of 1963. The capacity of the reverberatory smelting furnace has been limited by the moisture contained in the concentrates from the mill. During 1962 we experimented with various means of drying these concentrates. A process has now been selected, and the machines required have been ordered and should be installed and ready for operation during the second quarter of 1963. About that time it will be necessary to shut the smelter down for the periodic overhaul required in the furnaces and the boilers. Concentrates will continue to accumulate ahead of the smelter but should be worked off during the rest of the year, as the drying facilities are expected to increase smelter capacity by from 10 to 15 per cent. This smelter was originally designed to produce about 79,000,000 pounds of copper a year. It produced over 117,000,000 in 1962, and it is expected that the improvements made will enable the smelter to produce over 130,000,000 pounds per annum. Beyond this tonnage, a new reverberatory smelting furnace would be required. When additional ore is developed through exploration and improved mining methods, such an investment will be considered.

During the year a silver recovery circuit was installed in the mill. High-silver-bearing concentrates from this circuit were smelted separately for delivery to electrolyzing refineries where the silver could be recovered. The benefit from this silver recovery, which amounted to approximately $425,000, resulted in the reduction in the cost of that part of our production which was sold as electrolytic copper. As the price of silver is expected to continue to rise for a time, further improvements in this process are important and are under way.

A new semi-continuous casting unit was delivered to the smelter during December and is expected to be in operation early in 1963. This unit will increase the utilization of our Lake Copper by providing shapes which are sold at a premium, resulting in a slightly increased return on the copper sold. When we have become accustomed to using it, a second unit will be added.

White Pine — Development

The two new access and ventilation shafts which were finished in 1961 came into full operation during 1962. Ventilation has been improved and the flow of air through the mine was channeled by the closing of mined-out areas. This should result in some reduction in ventilation costs in 1963. A new mine layout system, which was developed during 1962, will help to maintain development ahead of production at an appreciable reduction in cost.

In the meantime, there has been an improvement in the grade of ore being mined in the original orebody, and marked improvements in production costs have occurred. This upper orebody can supply the mill and smelter to capacity for many years at what we believe will be even lower cost than that achieved in 1962.

Southwest Orebody

Development of this orebody continued during 1962. Our earlier plans called for the operation of the White Pine mine and the Southwest Orebody simultaneously in 1964. We have now decided to carry out further mining research in connection with the Southwest Orebody and to defer the time of its mining. This decision was in part prompted by the mining procedures and grade improvements at White Pine, which resulted in capacity operation of the milling equipment and the smelter at a higher profit level than originally anticipated. Also of importance in reaching this decision was the fact that the geological conditions mentioned last year in our annual report continue to cause mining problems at the Southwest site. We can afford to devote an additional period to investigate new and better mining procedures for the Southwest Orebody, since the recent improvements at the White Pine mine will, during this period, enable us to operate our facilities at full capacity, without incurring at this time the heavy capital expenditures which will be required to develop and equip the Southwest section of the mine.

Mine Research

The intensive research program launched to solve the Southwest Orebody mining problem will also have beneficial effects on mining the White Pine orebody. There are large sections of this main orebody which cannot be mined with the currently used methods and machines and they have not been so far included in our reserves. Mining research will lead us to the best solution of these problems, and, fortunately, it can be conducted concurrently with that done for the Southwest.

Geology

The ore at White Pine is comprised of two nearly flat-lying sequences of shale beds, separated by a bed of sandstone. These beds vary considerably in thickness from one part of the mine to another. They are the same in both the main part of the orebody and in the Southwest section of it. The copper is concentrated within certain of the shale beds in the sequences. If we could mine the high-grade zones alone, the deposit could be classified as high grade. The machines we now use to mine the ore are large and it is necessary to mine enough sub-economic rock with the ore to allow head room for them to function properly. By careful, continuous study, the geologists can determine the best combination of beds to mine in order that the most copper can be extracted with the least amount of dilution with waste rock. By having the geologists participate in the training of the miners, we are better able to achieve this objective. In 1961 the grade of rock delivered to the mill was raised from approximately 22 pounds per ton to over 23. For the last six months of 1962 the grade was maintained at well over 24 pounds per ton. Obviously, the higher the grade of ore sent to the mill, the lower will be the milling and mining costs per pound of copper produced.

The geologists have continued to map and drill our extensive land holdings in the district. No deposits were found during the year, but valuable data were obtained to guide our work for the future.

Ore Knob (Appalachian Sulphides)

For two years we have been purchasing concentrates from the Ore Knob mine of Appalachian Sulphides, Inc. in North Carolina. This independent mine, to our knowledge, was the only source in North America of copper concentrates pure enough to provide fluxes for the White Pine smelter. Early in 1962 Appalachian informed us that it would be out of ore by the end of August and that it did not intend to do any further exploration. After an examination, our geologists felt that there was a reasonable chance of finding more of this type of ore within reach of the existing milling facilities. We therefore purchased the company outright at about its liquidating value. Enough ore was found to continue operations into December. Intensive geophysical and geological work, supplemented by drilling, failed to indicate enough additional ore to warrant continuing mining. The mine was closed down in December and the property is being liquidated. Although this activity produced a slight loss on the books in 1962, it was offset by savings at White Pine through the use of these concentrates. This was a geological exploration project which had a better than usual chance of success at a lower than usual cost. The purchase of pyrite for the smelter has now had to be resumed.

Leases in Michigan

On August 3, 1962, the Copper Range Company and Calumet & Hecla, Inc. exchanged 99-year mineral leases on lands held in the Upper Peninsula of Michigan. Throughout the history of our two companies the interrelationship of our land holdings had inhibited full-scale exploration by either company in search for new ore. By leasing to them our lands in their area of operations and leasing from them their lands in our area, we have increased the exploration potential of both companies. Should one find and operate new orebodies in its area, the other will share in the results through modest royalties provided for in the leases.

C. G. Hussey Division

The necessity of the modernization plans for the C. G. Hussey Division, now in progress at Leetsdale, Pennsylvania, was re-emphasized in 1962. For the first time in thirty years its operations resulted in a net annual loss, although this was small.

The obsolete mill with its cramped quarters does not provide the costs that can withstand the continued pressure from foreign and domestic competition on the prices of mill products. Further serious injury to results stemmed from two strikes (one wildcat) which shut down mill operations for a total of eight weeks. Improved efficiency in the present plant achieved by extensive engineering and cost studies, together with some evidence of firmer selling prices, did reverse the decline in earnings, and, in fact, this Division operated at a small profit during the last four months of 1962.

Progress on the new facilities at Leetsdale is on schedule. The existing buildings have been remodeled to receive the new mills and supplementary equipment. Practically all of this was on order at year end, and the necessary foundations are being prepared for the scheduled deliveries and installation. At the present time, we see no reason why the operational target date of January 1, 1964 should not be met, at which time we should have as modern a sheet and strip copper mill for the items in which Hussey specializes as exists anywhere. While this new installation will result in very little increase in the total capacity as compared with the present facilities, the lower costs to be realized from it will enable us to regain our share of the market by providing the larger and heavier mill product packages now in increasing demand. Some unforeseen costs have materialized, and to assure the most modern operation, the purchase of some additional equipment has been found advisable. The total cost of this modernized plant will be about $8,000,000, of which $6,000,000 will be required in 1963. The move from the old to the new plant is being planned down to the smallest detail to provide continuity of operation and income, and to assure that promised deliveries to customers will be maintained on schedule. The costs incident to making this move will be substantial and will have an adverse effect on 1963 earnings.

The Hussey warehouse system is a very important factor in the profitable distribution of the products of the Hussey plant and the metal products of other domestic mills. The Cleveland warehouse was relocated during the year to a new, modern building in the Cuyahoga Heights district of that city. With the Pittsburgh warehouse to be located in the new mill, five of our seven distribution centers will be in new facilities especially designed for quick, low-cost deliveries. Plans are being studied for the improvement of the remaining two centers.

These programs are conceived and executed for the earliest possible return of the Hussey Division as a major contributor to the profit picture of the company.

Champion

This mine, which the company has been operating for over sixty years without many interruptions, operated throughout the year at a modest profit. It produced 358,548 tons of copper ore, which, together with the Redridge sands, delivered 5,964,392 pounds of copper to the market through the White Pine smelter. As the capacity of the latter has been taxed in recent months, the concentrates from the Freda mill will be smelted for us during 1963 on a toll basis by Calumet & Hecla in their smelter at Hubbell. For various reasons, development of ore in this mine was deferred in past years. Included in the 1962 costs was a considerable amount for development, and this will be increased in 1963. As a result of this, we hope that for the next few years the mine will be able to produce enough additional ore to replace the Redridge sands, which are becoming exhausted.

Champion produces ore lower in grade than that at White Pine and by more costly methods. That the operation continues to be profitable at all is a tribute to the staff and employees in Painesdale and Freda.

Lands and Forestry

Approximately 7,189,000 feet b.m. of timber were harvested and sold during the year, compared with 7,170,000 feet b.m. during the year 1961. The net income of the department after property taxes and depletion was $67,832 as compared with $44,675 in the prior year. This resulted principally from the sales of timber.

During the first six months of the year the market for all grades of lumber remained steady and good, but during the last six months the markets on the upper high grades fell sharply both in price and demand.

The pulpwood markets were considerably off from a year ago, particularly in the higher priced softwood species. This is partially due to the large-scale conversion by many pulp mills to the use of hardwood pulp, which in many cases is available within trucking distances of their facilities.

Stumpage prices received by the company for its timber averaged about the same as last year and were good; however, due to the drop in lumber prices during the last six months of the year 1962, prices on a few sales were lowered slightly in order to move the timber.

All field work and a part of the computations on the company's Continuous Forest Inventory project have been completed, and the final computations will be made currently in the U. S. Forest Service office at Milwaukee.

Douglass Lease

After the expiration date of the current lease, this property will be included in the arrangement with Calumet & Hecla. The modest royalties from this lease declined slightly in 1962.

Copper Range Railroad Company

The operations of the railroad in 1962 resulted in a virtual breakeven figure, compared with a loss of $86,175 in 1961. The 1962 achievement, however, was partly due to non-recurring income of $35,505, as a result of the loss by fire of our Houghton freight station, this being the difference between the book value and the amount received from insurance. Revenues increased from $244,582 in 1961 to $323,575 in 1962 due largely to uninterrupted operations of the Champion mine. The Directors of Copper Range Company have authorized making a tender for the remaining shares of the Railroad Company. The shareholders of the Railroad Company have been notified of this intention, and the tender will be made soon after the railroad makes its annual report for the year to its shareholders. The petition of the Railroad Company for the abandonment of two short, unprofitable sections remains before the Interstate Commerce Commission.

Housing

The sale of lots in the White Pine townsite, initiated in 1961, continues satisfactorily. By the end of 1962, 27 private houses had been erected, a new Lutheran Church had been constructed, and the Catholic Church had added a rectory. During 1963 most of the presently owned company houses will be offered for sale.

The program for selling the company houses in the Painesdale area was continued in 1962, when 44 additional dwellings or buildings were sold. There are 241 dwellings yet to be sold, of which only 39 are occupied and in fair condition. Purchasers were given 99-year leases on the land.

During 1962 the Sarah Sargent Paine Memorial Library in Painesdale became untenantable. With funds provided by the Paine family and the Copper Range Foundation, an attractive, modern building housing the library has been erected, and part of this building is being leased to the U. S. Post Office.

Financial Condition

As indicated by the summary of financial results on the page preceding this report, the Company was in strong financial condition at the year end. Consolidated net working capital amounted to $25,138,775 and the ratio of current assets to current liabilities on December 31, 1962 was 6.9 to 1. Consolidated cash items and U. S. Government securities at cost amounted to $15,444,743. The government loan to the White Pine Copper Company was reduced to $33,095,731 during the year, and remains paid a year in advance of contractual requirements. At the same time, the total book value of the net worth of the company has increased from $51,605,514 to $54,906,985 — an increase of $1.76 per share.

Following its policy of conserving cash to meet the capital expenditures required to continue to develop and improve the White Pine property, to explore and develop the Southwest Orebody, and to modernize the Hussey plant, the Board of Directors took no action on dividends in 1962. It also should be pointed out that the terms of the government loan to White Pine Copper Company require the approval of the government to payment of dividends by White Pine to Copper Range. The government's consistent position to date has been that any available earnings of White Pine should be applied to reduce its loan.

Markets

Our published price of White Pine Lake Copper has remained at 31 cents per pound since May, 1961. Except in times of government controlled prices, this is the longest period of stability for the price of copper in the modern history of the industry. At this writing there are no serious indications that a change is likely to occur in the foreseeable future. This stability is the result of a number of conditions. The total world markets have materially expanded over the past decade. These markets are wider spread and not as concentrated in the United States and Europe as they were previously. Furthermore, the number of sources of supply has increased and they are more widely distributed; therefore, disruptions in production due to strikes and political problems have individually had much less serious effect upon the market. In the past few years, when the American market has been weak the markets in Europe or elsewhere have been strong — and vice versa. Finally, individual producers have tended to tailor production to their own sales, so that inventory accumulations have not been so large. In the past, high inventories have had a depressing effect upon the markets.

The wide price fluctuations in the past have been a serious deterrent to the markets for copper. The copper mills report that some of the recent increases in consumption (6 per cent in 1962 over 1961) seem to be due to the stability of the price. Therefore, unless serious deflationary forces appear, it would seem that the general market for copper should stay relatively stable or continue upward.

Interest in the special properties of White Pine Lake Copper appears to be increasing at every level of consumption, starting with design and engineering. Our own technical advertising and consultations have encouraged the trend. This will be enhanced by a wider choice of refined shapes from the first of our semi-continuous casting installations, which should be made available to copper mills in 1963.

Better control of the silver content, expected as a result of research now being carried on at White Pine, should make various grades of White Pine Lake Copper even more in demand, and in 1963 we should be getting better returns from the silver contained in the ore.

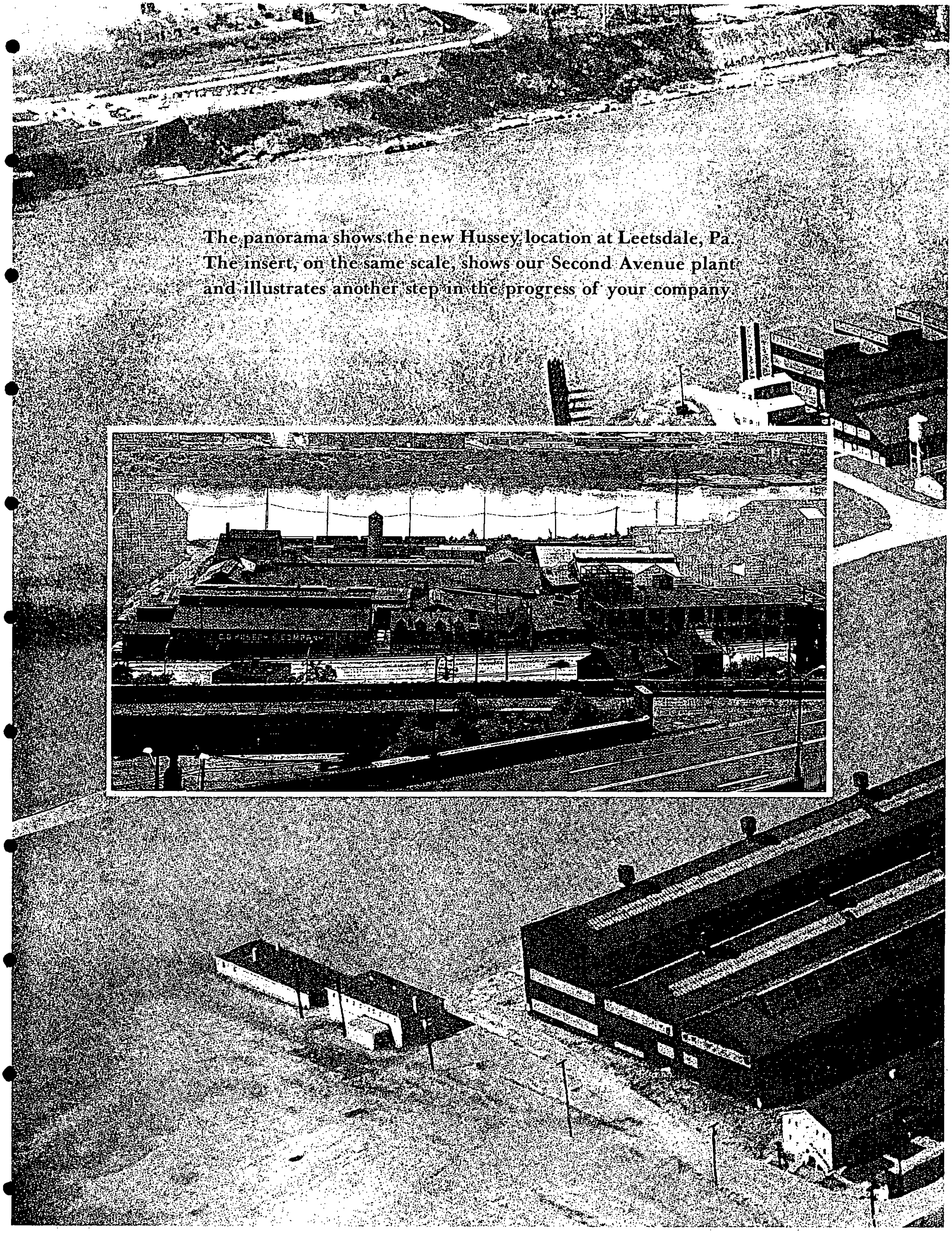
The copper fabricating mills, on the other hand, continue to face difficult times. The spread between the cost of copper and the prices realized from semi-fabricated forms continued to narrow until late 1962, when there was a slight indication of reversal. There are still substantial surpluses of rolling capacity. These surplus capacities, together with the continued threat of imports, act as a depressant on the product prices to the point that few fabricating mills are making satisfactory earnings. This has been one of the longest and worst periods in the history of this important industry. With intensified research now being carried on individually by companies and together through the International Copper Research Association, the promotional activities of the newly formed Copper Development Association, Inc., and the steadiness in the price of copper, the future can be only brighter. Hussey's modernization should be completed at about the right time.

Research

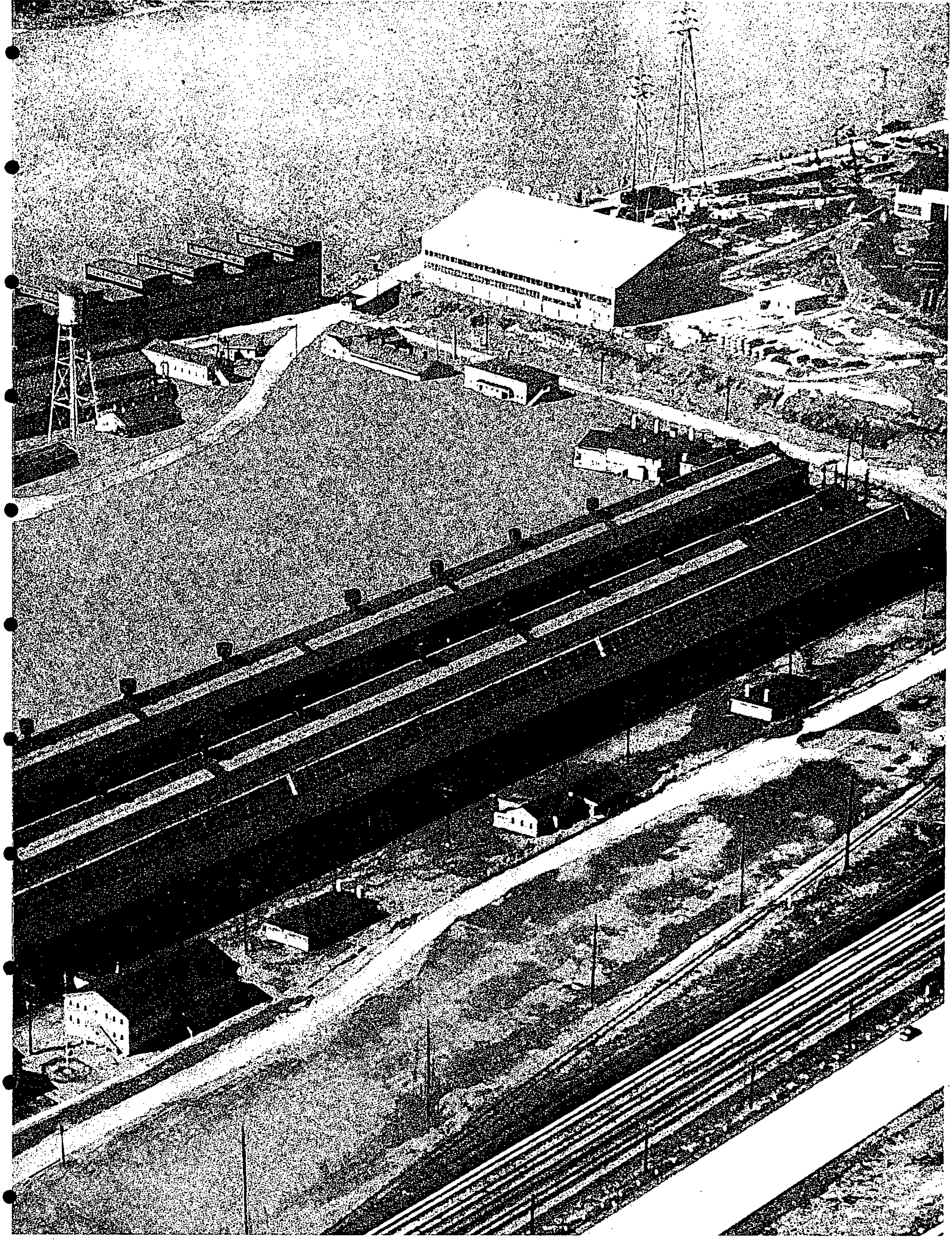
The research activities of the company were strengthened during 1962 by the appointment of an Assistant to the Vice President for Research, a metallurgist at Hussey, and a Director of Mining Research at White Pine, together with additional staff devoted to mining research.

For the reasons described under "Geology," there are many areas in the mine which can be improved through research. The addition of the new company-designed shuttle cars, new blasting techniques, drilling and mine layout are all the result of research activities. They have contributed much to the reduced costs. We are still using the same general mining method we started with, involving a definite limitation on the size and utilization of machines. These methods will not recover some of the ore that has been temporarily by-passed or that remains ahead of us. Up to now, there has been more advantage in improving what we have than in making major innovations. Every year new machines appear and new methods are developed. Now we must devote strenuous efforts toward finding those methods and machines that will not only continue to improve costs but lengthen the life of our reserves. There are, fortunately, many avenues to explore, several of which show promise of good results in these directions. The Board of Directors has approved substantial funds for this purpose, to be spent in 1963.

In 1962 much of the attention of the headquarters research staff was concerned with the Hussey modernization program. In 1963 their attention will be redirected toward ascertaining more about the uses and properties of White Pine Lake Copper and disseminating



The panorama shows the new Hussey location at Leetsdale, Pa. The insert, on the same scale, shows our Second Avenue plant and illustrates another step in the progress of your company.



this information to our customers and to industry.

The Alloyd Electronics Corporation continued work on the properties of and new uses for our copper during 1962. They have provided useful data to assist in improving the Hussey operation.

The White Pine Mill Research Department has devoted most of its energy to the piloting of the leaching process and the laboratory investigations necessary to carry out this undertaking. The pilot plant demonstrated the efficacy of the process during the year, and is now being used to measure the parameters for the design of the full-scale plant. Some technical details proved to be perplexing enough that our target date for completion had to be postponed for several months. Engineering studies began early in 1963 to determine the economic feasibility of this process based on the pilot results.

The work of the International Copper Research Association and the Copper Development Association, Inc. was supported by the company. The impact of such work is reported under "Markets."

Industrial Relations

Our employees are represented by unions at Champion, Hussey and White Pine. During 1962, contract renewals resulted in improvements in wages and benefits for the employees and some improved contract terms for the company. The White Pine contract was completed after protracted negotiations without a work stoppage, except for one day because shutdown of activities could not be delayed when negotiations continued up to the deadline. The negotiations generally were conducted in a friendly atmosphere with each side recognizing the problems of the other and, after settlement of the contract, work continued with improved morale. The year was marred, however, by two strikes at the Hussey Division. In February the International Union of Operating Engineers, with a membership of only seven employees out of a total of 549, decided not to accept the agreement worked out in December, 1961 with the union that represents the other employees of this Division. They struck the plant on February 12, 1962 and did not permit resumption of operations for five weeks, at which time they accepted virtually the same terms as those in the original contract. In October two men, instead of using the arbitration procedures spelled out in the contract, persuaded their associates in one department to set up a picket line, which the other employees honored. After three weeks the picket line was removed. The employment of these two men was terminated and their dismissal was upheld by arbitrators.

Both the White Pine and Champion contracts are for two years, and will expire in 1964. The Hussey contract negotiated in 1961 was reopened in December, 1962 for wages only, and also will be open for wages early in December, 1963. It expires in December, 1964.

Personnel

There have been several changes in the official family of the company since the last annual report. Ernest J. Sargeant of Ropes & Gray was elected by the shareholders to the Board of Directors. R. C. Cole, the Executive Vice President of White Pine Copper Company, was elected Vice President of Copper Range Company. David M. Goodwin relinquished his duties as Treasurer and J. Roland Ackroyd was elected Secretary-Treasurer of Copper Range and White Pine. W. Peter Carey relinquished his duties as Assistant Secretary of both companies and Donald E. Crafts was elected to these positions.

At White Pine John Bley was appointed Director of Mining Research.

In January of 1963 James K. Richardson, formerly a consultant to the Copper Range Company through his association with Glover Associates, Inc., became a full-time consultant to the President for organization and planning. Andrew D. Hunter joined the New York executive staff in February, 1963. Mr. Hunter came to us from the presidency of Howe Sound Copper and Brass.

Principal Office

With the installation of the Secretary's office in New York in 1962, all headquarters office activities of the company are now in New York.

1963

Improvements introduced in 1961 showed cumulative effects in 1962. Many more were initiated in 1962, which will have beneficial effects in 1963. These will be partly offset by heavy expenditures involved in the movement of the Hussey Division to Leetsdale toward the end of the year, many of which will be expensed against earnings. Nonetheless, the marked improvements demonstrated in the latter months of 1962 at White Pine and some new ones already well established in 1963, should more than overcome the non-recurring costs at Leetsdale. Some in-process inventories, which accumulated at White Pine due to the imbalance of facilities during the last quarter of 1962, should be worked off in 1963. The 31 cent price, which has held for over twenty months, does not appear to be under pressure for variation. The steady improvement in earnings which has taken place over the past two years should continue, albeit at a slower pace until the Hussey modernization begins to provide the hoped for results.

For the Board of Directors

James Boyd

President

March 29, 1963

CONSOLIDATED STATEMENTS OF INCOME AND EARNED SURPLUS

FOR THE YEARS ENDED DECEMBER 31, 1962 AND 1961

CONSOLIDATED INCOME

	1962	1961
Sales and other income		
Sales of copper and copper products	$47,767,588	$49,922,660
Investment income and other interest	634,526	649,362
Royalty from Douglass lease	35,399	43,819
Gain on disposition of plant assets	17,953	139,587
Other, principally sales of timber (net)	154,414	132,635
	48,609,880	50,888,063
Costs and expenses		
Cost of sales and other charges	34,709,011	38,710,101
Depreciation	3,353,798	3,338,030
Selling and administrative expenses	4,373,703	4,228,676
Interest paid	1,823,464	1,953,617
	44,259,976	48,230,424
Income before federal income taxes	4,349,904	2,657,639
Provision for federal income taxes	1,050,000	—
Net income for year	$ 3,299,904	$ 2,657,639

CONSOLIDATED EARNED SURPLUS

	1962	1961
Balance at beginning of year	$21,669,802	$19,012,163
Net income for year	3,299,904	2,657,639
Balance at end of year	$24,969,706	$21,669,802

The accompanying notes are an integral part of these financial statements.

CONSOLIDATED BALANCE SHEETS

DECEMBER 31, 1962 AND 1961

ASSETS	**1962**	**1961**
Current assets		
Cash	$ 2,744,954	$ 3,752,729
U. S. Government securities, at cost	12,449,789	13,520,153
Certificates of deposit	250,000	200,000
Receivables, less allowance for doubtful accounts	4,428,530	4,101,293
Inventories		
Copper and brass	5,748,075	4,936,179
Supplies	3,510,355	3,330,919
Prepaid expenses	276,365	296,848
Total current assets	29,408,068	30,138,121
Investments in Copper Range Railroad Company and others	2,782,086	2,523,398
Mines, lands, mine development, mineral rights and timber tracts	11,586,788	11,111,679
Buildings, machinery and equipment	81,986,669	79,102,163
Reserves for depreciation	(33,011,368)	(31,345,616)
Deferred charges and other assets	178,484	239,101
	$92,930,727	$91,768,846
LIABILITIES		
Current liabilities		
Accounts payable	$ 2,125,732	$ 2,277,501
Accrued wages, state and local taxes and other expenses	1,397,048	1,390,100
Federal income taxes	746,513	—
Total current liabilities	4,269,293	3,667,601
Mortgage notes payable, due after one year	33,095,731	36,495,731
Deferred credit	658,718	—
STOCKHOLDERS' EQUITY		
Capital stock, $5 par value		
Authorized — 3,000,000 shares		
Issued — 1,877,573 shares, 1962; 1,877,473 shares, 1961	9,387,865	9,387,365
Capital surplus	20,549,414	20,548,347
Earned surplus	24,969,706	21,669,802
	$92,930,727	$91,768,846

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS

Basis of Consolidation

Financial statements include the accounts of Copper Range Company, White Pine Copper Company and three inactive wholly-owned subsidiaries.

Inventories

Metal contents of inventories of the fabricating division are stated at cost on basis of last-in, first-out inventory method, which was below market as at December 31, 1962. All other inventories are stated at lower of cost or market on basis of first-in, first-out inventory method.

Property

	Assets	*Reserves for Depreciation*
Copper Range Company		
Mining division, as valued by directors as at December 31, 1931, plus additions at cost	$ 9,886,916	$ 4,147,217
Fabricating division, at cost	4,742,282	1,774,047
White Pine Copper Company, at cost	78,944,259	27,090,104
	$93,573,457	$33,011,368

The company and its subsidiaries have consistently followed the practice of stating their accounts without deduction for depletion of metal mines, and no such deduction is included in these financial statements.

Investments

The investment in Copper Range Railroad Company (80.6% owned subsidiary not consolidated in these statements), amounting to $1,057,131 is stated in part at cost and in part at a value determined by the directors in 1931. Operations for year ended December 31, 1962, resulted in a loss.

Investments in other companies are stated substantially at cost, $1,724,955.

Mortgage Notes Payable

Fixed and contingent installments due in 1963 on White Pine Copper Company 5% mortgage notes with the Secretary of the Treasury were prepaid in 1962. Remaining fixed payments are due beginning January 1, 1964 at $3,400,000 a year, in quarterly installments of $850,000 and additional amounts may be payable based on White Pine Copper Company earnings as defined in loan documents.

Dividends may not be paid by White Pine Copper Company without approval of the mortgagee.

Deferred Credit

During 1962, the company acquired new property to which it is moving its fabricating division. The gain on disposal of the old property, less certain transition costs, has been deferred. The balance of the account will be applied to similar costs in connection with the transfer of operations to the new property in 1963.

Restricted Stock Option Plan

At the annual meeting on May 2, 1962, the stockholders approved amendments to the restricted stock option plan, approved in 1953 for key personnel, whereby the number of shares of common stock covered was increased from 76,703 shares to 100,000 shares, and the expiration date for the granting of options was changed from May 6, 1963 to May 6, 1967. No options were granted during 1962, and 29,188 shares were still available for option at December 31, 1962. Option price is at least 95% of the market value on the date granted. At the beginning of the year, 59,309 shares were issuable under options previously granted. During the year, an option for 100 shares (at $15.67 per share) was exercised, leaving 59,209 shares (at prices from $13.78 to $34.68 per share) issuable at December 31, 1962.

Retirement Plans

A retirement plan for qualified full-time salaried employees of the companies, effective January 1, 1957, was approved by shareholders May 1, 1957. The liability for past service costs of this plan has been fully funded.

In addition to the retirement plan referred to above, the company has a pension plan for non-salaried employees of its fabricating division; the unfunded past service costs (not recorded on books) are estimated to be $217,000 at December 31, 1962.

During 1962, $164,788 was charged to earnings to cover current service costs and $127,142 for past service costs.

Federal Income Taxes

Taxable income differs from the net income reported herein due to adjustments for depreciation, statutory depletion allowances, loss carry-forward, development expenditures, gain on property disposal and other miscellaneous adjustments in the consolidated tax return to be filed by the company.

Since 1955 the company has deducted on its tax returns amortization of qualified assets of White Pine Copper Company pursuant to certificate of necessity, permitting complete deduction for tax purposes over a period of five years, but has recorded on its books straight line depreciation based on estimated useful lives of the various assets.

The excess of book depreciation over tax depreciation now results in an adjustment increasing taxable income which is offset in part by the allowable deduction for statutory depletion. This condition will continue over the remaining useful lives of the qualified assets. The net adjustment increased the 1962 Federal income tax by approximately $475,000.

Development expenditures for the Southwest Orebody are capitalized on the books and claimed as a deduction on income tax returns.

Federal income taxes were not payable for the year 1961 because of tax losses in prior years. At December 31, 1961, the company had approximately $1,100,000 tax loss carry-forward which has been applied to taxable income for 1962 in determining the tax provision of $1,050,000.

Federal income tax returns for the company have been examined through the year 1959. Returns for the years 1960 and 1961 are now in process of examination.

AUDITORS' CERTIFICATE

SCOVELL, WELLINGTON & COMPANY
Accountants and Auditors

New York, March 12, 1963

TO THE BOARD OF DIRECTORS OF
COPPER RANGE COMPANY

We have examined the consolidated balance sheets of Copper Range Company and its wholly-owned subsidiaries as at December 31, 1962 and 1961, and the related consolidated statements of income and earned surplus for the years then ended. Our examinations were made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

The practice of the company in computing consolidated net income without deduction for depletion of metal mines is in accordance with accepted accounting procedures in the copper-mining industry, and is in agreement with long established and consistently maintained accounting practices of the company and others similarly situated.

In our opinion, the accompanying consolidated balance sheets and consolidated statements of income and earned surplus present fairly the financial position of Copper Range Company and its wholly-owned subsidiaries as at December 31, 1962 and 1961, and the results of their operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Scovell, Wellington & Company

LAKE COPPER
COPPER RANGE
WHITE PINE

HISTORICAL TABLE

YEAR	Net Income	Number of Common Shares	Earnings Per Share — Adjusted (1)	Cash Generated	Capital Expenditures	Total Dividends Paid
1962	$3,299,904	1,877,573	$1.76	$ 7,362,808	$ 4,446,070	—
1961	2,657,639	1,877,473	1.42	6,093,439	3,139,191	—
1960	(1,291,022)	1,877,473	(.69)	2,332,794	2,932,954	$ 938,761
1959	2,405,095	1,877,473	1.28	6,549,145	1,732,632	938,761
1958	2,585,309	1,877,473	1.38	6,822,880	883,624	938,749
1957	2,164,979	1,877,473	1.15	6,335,354	1,968,492	1,876,546
1956	9,155,972	1,875,420	4.88	13,078,978	1,885,351	1,787,984
1955	9,040,059	1,778,534	4.84	12,466,259	3,673,328	621,419
1954	2,223,184	706,158	1.43	2,365,960	27,341,904	564,926
1953	3,307,092	706,158	2.12	3,366,813	27,756,254	564,926
1952	2,006,476	706,158	1.29	2,146,741	9,284,234	564,708
1951	1,041,822	706,158	.67	1,186,118	238,806	564,655
1950	598,625	706,158	.38	1,884,266	333,879	451,942

1950-1962

Dividends Per Share — Adjusted (1)	Percentage of Earnings Paid in Dividends	NET WORKING CAPITAL TOTAL	NET WORKING CAPITAL Per Share — Adjusted (1)	BOOK VALUE TOTAL	BOOK VALUE Per Share — Adjusted (1)	Long-Term Debt Balance	Refined Copper Production
—	—	$25,138,775	$13.39	$54,906,985	$29.25	$33,095,731	117,484,025 lbs.
—	—	26,470,520	14.10	51,605,514	27.49	36,495,731	112,881,034
$ .50	—	26,151,143	13.93	48,947,875	26.07	39,080,731	79,583,493
.50	39.03%	31,499,707	16.78	51,177,658	27.26	42,480,731	74,776,464
.50	36.31	32,852,309	17.50	49,711,324	26.48	46,861,333	86,431,989
1.00	86.96	29,081,421	15.49	48,064,764	25.60	51,448,048	74,938,684
.95	19.47	29,110,347	15.52	47,723,992	25.45	51,596,274	80,426,212
.33	6.82	26,486,265	14.18	40,361,203	21.61	57,850,876	68,137,483
.36	25.17	10,869,710	6.98	22,380,383	14.37	60,091,705	4,157,588
.36	16.98	12,116,342	7.78	20,722,125	13.31	40,212,532	4,365,857
.36	27.91	10,547,786	6.77	17,979,960	11.55	9,370,000	2,540,247
.36	53.73	9,339,187	6.00	16,538,192	10.62	—	1,851,521
.29	76.32	8,889,015	5.71	16,061,024	10.31	—	2,471,043

Since 1955 the company has deducted on its tax returns amortization of qualified assets of White Pine Copper Company pursuant to certificate of necessity permitting complete deduction for tax purposes over a period of five years, but has recorded on its books straight line depreciation based on estimated useful lives of the various assets.

At April 30, 1960 all assets subject to accelerated amortization were fully amortized for tax purposes. Since then, tax depreciation has been less than book depreciation, and will continue to be less for some years to come.

Construction of White Pine began in 1952 and operations at White Pine commenced in 1955.

(1) Adjusted to reflect: 25% stock dividend 12/5/50, 2 for 1 stock split 3/18/55,
5% stock dividend 12/29/55 and 5% stock dividend 12/15/56.

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COPPER RANGE COMPANY

ESTABLISHED 1899

630 FIFTH AVENUE

NEW YORK 20, NEW YORK

PRINTED IN U.S.A.

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FIFTY YEARS ON THE SOUTH RANGE

by

Harry T. Mercer

FIFTY YEARS ON THE SOUTH RANGE

INDEX

1. FOREWORD

Our president, Mr. Morris F. LaCroix, has asked me to compile a little story about the South Range. Not because of any particular ability as a writer, but because one of the oldest employees of the Copper Range Company now living should remember things of more or less interest. Hence these reminiscences, which are dedicated to all the fine people with whom I have been associated for 50 years.

2. HALF A CENTURY ON THE SOUTH RANGE

Much has been written about the northern part of the Copper Country, from Portage Lake to the end of Keweenaw Point, and a good deal about the Ontonagon country, but not so much about the so-called South Range, or that part extending from Portage Lake to the Ontonagon county line.

The term South Range should not be confused with the south trap range, which is a name given by early explorers to isolated outcroppings of rock several miles east of the main range. An example of this is the so-called Silver Mountain, 14 miles southwest of L'Anse bay, near the Sturgeon river in Section 1, Township 49 north, of Range 36 west. The South Range, as we know it, is that part of the main copper-bearing area lying southwest of Portage Lake, containing the Atlantic, Baltic and Isle Royale lodes. It is unfortunate that a more human record was not kept of the men who pioneered this area, their problems and difficulties and how they were solved.

To write about the older now abandoned mines would be futile for one who has no first-hand knowledge of them. Therefore, this story will be confined mostly to the past 50 years and must be a more or less personal story of the mines comprising the Copper Range group and some of the people concerned with their development.

Some years ago, in writing of early days at Ontonagon, as many amusing or interesting things were related as could be remembered, but much was lost due to failure to take notes when older people talked. The writer's father, James Mercer, was clerk on one of the steamers that sailed the lakes in the late eighteen forties and early fifties. He later was clerk for a short time at the old Shelden & Columbian mine at Houghton.

3. EARLY METHODS OF TRAVEL

The writer first visited Houghton as a boy in 1890, going from Ontonagon by steam-boat.

At that time the bridge across Portage Lake was a toll-bridge of wood construction.

About 1894, five of us boys made the trip in a sail-boat.

Of course, there were no motor-boats or automobiles then and no direct rail connection. To go by rail meant going to Sidnaw on the C. M. & St. P. Ry., spending part of the night there, and then on the D.S.S.&A. Ry. to Nestoria and Houghton. Going by team meant driving 52 miles over very poor roads. So we decided to sail. Compared with present day travel, a short description of this trip might be of interest. We left the harbor at Ontonagon at 1:00 a.m., the main reason for the late start being that there was a show in town that night, a rare occasion in those days, especially one in which the ladies wore tights, then considered a shockingly abreviated costume. Naturally, we young fellows had to see it. Also, by starting late, advantage was taken of the night breeze, which was southerly and almost a fair wind. The canal was reached at 7:00 a.m., or 6 hours for the 42 mile run. Upon entering Portage Lake the wind died and it took until 6:00 p.m. to make Houghton, 10 miles from the canal. A fast motor-boat can now make this trip in about two hours.

4. THE MINING SCHOOL

As the college at Houghton has had considerable influence in the mining industry, no story of this district would be complete without some mention of it.

The need for a school to train men for the scientific development of the mining industry was early recognized. A bill to establish such a school was under consideration as early as 1861 but did not pass. The Michigan Mining School was finally established by a bill passed in 1885 and the school started in 1886 in a room over the Houghton fire-house. Much credit must be given to the Hon. Jay A. Hubbell for fostering and securing the passage of the bill and to J. Parke Channing, mining engineer, for keeping mining men and the general public awake to the need for such an institution. Some of the land for the present campus was donated by Mr. Hubbell.

The first principal, or director of the school, was Mr. Albert Williams, a graduate of Princeton. He was succeeded in 1887 by Dr. M. E. Wadsworth, a graduate of Bowdoin and Harvard. The school was moved to its present site in 1889, the first building being what is now Hubbell Hall. In 1897 the name was changed to the Michigan College of Mines. Dr. Wadsworth deserves much credit for building up the school against great difficulties. He resigned in 1899 and was succeeded by Dr. F. W. McNair, better known (privately, of course,) as Murphy, why, nobody remembers. Dr. McNair was an excellent teacher and in his lectures had the ability of making things very clear. He was killed in a railroad accident in 1924 and was succeeded by Dr. W. O. Hotchkiss, former state geologist for Wisconsin.

During Dr. Hotchkiss' time the scope of the college was broadened. The name was changed to the Michigan College of Mining and Technology and women were admitted as regular students. Previously, they could only enter for special work. About 1894 one such girl was taking some work in mineralogy. One day in the laboratory she was reaching up to take down two heavy trays of specimens just as a senior, whom we shall call John E., entered the lab. He noticed what she was doing and said: "Wait a minute, Miss B., let me take down your drawers for you." Whereupon he lifted the trays down and set them on the table. There were several fellows present at the time, but not a laugh was heard.

One of the professors who left the college in 1898 to become superintendent of the Arcadian mine, just north of Houghton, is responsible for the following story: At this mine, fine shops and other buildings had been erected before much underground development was done. Some one chided the superintendent about this, and he replied: "Gentlemen, I work for some people in Boston. If they told me to build a row of silver out-houses from here to Lake Superior, I would do it.". Incidentally, there was great excitement about the Arcadian. They even ran a stage from Houghton for those who wanted to visit the property. Nothing much came of it and it was soon abandoned.

Among the notable (?) characters of those days were the denizens of certain emporiums, several of which graced Houghton and vicinity. One madam used to hire a fine team and carriage with a coachman and ride in style to do her shopping. She smoked big, black cigars, could out-swear most men and had a heart as big as a house. One of these girls, quite attractive, who had only been in the county a short time, took a dare and attended a dance with two of the boys. She met and danced with several of the prominent men present and no one caught on. The two who brought her had to retire at times for a good laugh. These ladies were publically reviled, surreptitiously visited and probably deserved a bronze star for their patience and tolerance.

But we have digressed far enough. This was to be a sort of story of the South Range and its mines, so let us get on with it.

5. EARLY MINING

It might be well to note briefly some of the older mining ventures. In 1851 the first exploration south of Portage Lake was done in Section 18, T.54 N., R.34 W. near the present town of South Range by the Ebeal-Kate Mining Company, organized by Dr. S. S. Wallbank, a Mr. W. W. Palmer and others. The mine and the hill nearby were named after Mrs. Kate Wallbank, Wheal being the Cornish name for mine. The work did not disclose anything of value and was abandoned in 1853. An old lake captain told of the time his schooner, having had no fresh vegetables for some time, stopped in Portage Lake and the crew walked up to the Wheal-Kate to get some potatoes to ward off the scurvy.

In 1852, the Isle Royale Company, which had been mining on the island of Isle Royale, transferred their operations to Portage Lake and discovered the Isle Royale lode. The Isle Royale, therefore, was the first actual copper producer in the Portage Lake district. It also is noted for installing the first steam engine in the district. It is said that when the whistle first blew, the men took the day off to celebrate.

The Shelden Mining Company was started in 1853 and re-organized in 1864 as the Shelden & Columbian. Two shafts and an addit were situated on the lots now occupied by the residences of A. F. Rees, R. M. Edwards and Michael Messner in East Houghton. A mill was built on the site now occupied by the R. M. Edwards barn. This company produced 700 tons of copper before it was closed in 1870. Mr. Michael Messner, of Houghton, has a door in his cellar leading into a part of a tunnel of the old Shelden & Columbian mine. It makes an ideal place to store things that must be kept cool.

6. THE ATLANTIC

The South Pewabic Copper Company was organized in 1865 and began work on what is now known as the Atlantic lode, with Mr. Wm. B. Frue as Superintendent. Mr. Frue was the inventor of the Frue vanner, a machine for concentrating fine copper. In 1872 the property was sold and the Atlantic Mining Company was formed. Although the lode was not rich, containing only about three quarters of one per cent copper, it was of fairly uniform grade throughout, so no selection of the rock was necessary. The first stamp mill was located on Portage Lake just east of the present Michigan Smelter and a 3-mile railroad connected the mine and mill. Then in 1894-95, the government having taken over the Portage Lake water-way and prohibiting further dumping of sand in the lake, a new mill was built on the shore of Lake Superior at the mouth of the Salmon Trout River, and 9 miles of railroad, called the Atlantic & Lake Superior R.R., was built to the mine. A dam was built across the river to provide the mill with water by gravity. After the Baltic mine was started in 1899, a new dam was constructed to supply water for both mills, the Baltic mill being on the shore west of the river. This was a steel gravity dam designed by Mr. J. F. Jackson and built by the Wisconsin Bridge & Iron Company at a cost of $150,000, one-half being paid by each company. The Atlantic worked until 1906, when it was closed due to caving troubles. This property now belongs to the Copper Range Company and will probably be worked again when conditions warrent. The mine reached a total depth of 3,120 feet, had 123,000 lineal feet of drifts and produced 118,319,529 pounds of copper, including 62,501 pounds from the Section 16 exploration.

Mr. Joseph E. Gay was president of the Atlantic during the life of the mine. He was also connected with the Wolverine and Mohawk mines north of Calumet. Mr. John Stanton, liked and respected by all who knew him, was secretary and treasurer of the company for many years and took an active interest in its management until his death in 1906, the very year that the mine closed. His son, John R. Stanton, was on the board of directors and was treasurer for a time. The other son, Frank McM. Stanton, was agent at the mine for many years. As a hobby he had a small but well-equipped machine shop in which he spent some of his spare time.

Mr. F. W. Denton was superintendent at the Atlantic for a few years and had a part in the laying out and construction of the Atlantic & Lake Superior R.R.

He left in 1903 to become the first general manager of the Copper Range Consolidated Company.

Mr. William A. Paine was on the board of directors in later years and he became the first president of the Copper Range Company. More about these two men later.

Mr. Theodore Dengler, mining engineer for both the Atlantic and Baltic, became superintendent of Atlantic after Mr. Denton left and later, after the mine closed, he became manager of the Wolverine and Mohawk mines, which position he held until his death in 1940.

Dr. John W. Moore, the mine physician at Atlantic, was a handsome, dignified gentleman. He was well-read, an interesting talker and had a vocabulary of cuss words that was a marvel, even in those rough and ready days.

Mr. Michael Messner, Sr., affectionately known as Old Mike, was quite a remarkable character. While not on the mine staff, he was very closely connected with the work, as his teams and men handled most of the supplies and machinery for the mines before the railroad was completed. He also did a good deal of farming, considerable logging, and for some years handled wood and coal on the Range. Mr. Messner owned a fine team of driving horses and every Saturday afternoon he and the mine clerk, Mr. A. D. Edwards, would drive in to Houghton. The people of Houghton knew that the week was properly and officially ended when Mike and A. D. drove up main street and stopped in front of John Dillon's emporium. Mr. Messner always wore high, pull-on boots, even on Sundays. His manner was somewhat brusque, but he had a heart of gold and secretly helped many a poor family, either financially or with wood or coal. His passing in 1930 was mourned by every one. A story about him comes to mind. One cold November day the writer was doing some work at the Atlantic school and had become well chilled. Mr. Messner, who was on the school board, came by and said: "Mercer, how would a nice high-ball go now?" The suggestion had a definite appeal, so we went over to his house where we did justice to some excellent Bourbon. He pointed to another bottle and said: "You see that pencil mark on the label? Well, when E. R. Goodell comes back, we are going to lower that mark." Unfortunately, Mr. Goodell, who was in California, never returned. The fate of the bottle is uncertain.

Mr. and Mrs. Fred A. Jeffers have been connected with the schools of the South Range since 1891. They first taught at the Atlantic school, where Mr. Jeffers was principal. Later Mr. Jeffers was made superintendent of all the Adams Township schools, which office he still holds. He was also a member of the State Board of Education for some years. Mrs. Jeffers is principal of the Painesdale high-school and they have recently rounded out 50 years of teaching. Mr. Jeffers is an eloquent speaker and has always been in great demand on numerous public occasions. The school system these fine people established, is considered an excellent example of educational methods. Incidently, Mr. Allan F. Rees, of Houghton, once taught at the Atlantic school and used to walk out from Houghton, a distance of 3 miles, every day. Mr. Rees was soon thereafter admitted to the bar and for several years was the attorney for the Copper Range Company. His hobby was sailing and he held master's papers for the Great Lakes. Mr. Rees was a real gentleman of the old school, noted for his courtly manner and tolerance, and was sincerely mourned by the whole copper country when he died in 1945.

7. THE BALTIC

In 1892 Capt. John Ryan, father of John D. Ryan of Anaconda, began explorations at six-mile hill, 6 miles south of Houghton, but the operation was not successful. Then the St. Mary's Land Company optioned this tract to an English promoter, a Major Richie, but no work was done. In 1897, Capt. W. A. Dunn took an option on the property and within three months had a showing that resulted in the formation of the Baltic Mining Company which later became part of the Copper Range. The Baltic produced its first copper in 1898, using a leased stamp-head at the Atlantic mill. Later the Baltic mill was built on the shore of Lake Superior, just west of the Salmon Trout river, using water from the new dam built by the Atlantic and Baltic companies. The Baltic was very rich at the top, but became poorer at depth and was finally stopped in 1932. This mine reached a total depth of 4,600 feet, had 205,000 lineal feet of drifts and produced a total of 283,487,448 pounds of copper. Capt. Martin Trethewey was mine captain at the Baltic and William Cole was the clerk. Mr. Cole was an excellent clerk and could furnish any details connected with the office at a moments notice.

Mr. W. J. Richards was master mechanic at the Baltic and later of all the Copper Range mines. Although somewhat dictatorial, he was a good mechanic and took great pride in keeping the machinery in good condition. He was especially good at erecting and lining up machinery of all kinds and his advice on such matters was always to be relied upon.

8. THE COPPER RANGE RAILROAD

About 1884 Mr. C. A. Wright, of Hancock, conceived a plan for a railroad to run from Houghton south along the range. As first planned it was known as the Northern Michigan R.R. Company, and was to go through to Watersmeet, in Gogebic County, connecting there with the C.&N.W. R.R. The preliminary surveys were made by Mr. E. W. Stockly and others. The road would run through the south range mineral lands that were then mostly undeveloped. Among the projectors and chief contributors to the fulfillment of the plan were Mr. W. A. Paine, of Paine, Webber & Co., and Mr. R. R. Goodell, Agent of the St. Mary's Canal Mineral Land Company. These men were also much interested in the development of the south range area.

The panic of 1893 and other causes contributed to delay the project until, early in 1899, the Copper Range Company was organized to build the road and to acquire 7,500 acres of mineral land. The St. Mary's Company also offered a bonus of 2,240 acres of land upon the completion of the road. The Watersmeet end was abandoned and the road, named the Copper Range R.R., was completed to connect with the C.M.& St. Paul Ry. near Mass, in Ontonagon County, the junction point being named McKeever, after the road's first General Manager. The first passenger train was run from Houghton to Ontonagon in September, 1899.

Later the road was extended north to Calumet via Lake Linden, giving the company about 65 miles of main line.

At first the main line passed about two miles west of Painesdale and a branch connected the mines with the stamp mills on Lake Superior, crossing the main line in Section 8. Hence the name, Mill-Mine Junction. In 1914 the road was extended south of Painesdale to connect with the original main line in Section 3, T. 53 N., R. 35 W. and the part between there and Mill Mine Junction was abandoned. Mr. R. T. McKeever was the first General Manager. The present General Manager is Mr. Homer W. Johnson and Mr. F. L. Batchelder is Chief Engineer.

From July, 1912 to Dec.1921 the C.M.& St. Paul Railway ran a daily passenger train, called the Northern Michigan Special, between Chicago and the Copper Country via the Copper Range R.R. This train left Chicago at 5:30 p.m., arriving in Houghton at 7:30 a.m. Going down, it left Houghton at 10:00 p.m. and arrived in Chicago at noon the next day. There was a sleeper on the train and a diner was put on at Green Bay. This train was a great convenience to the Range people, but a falling off in passenger traffic forced it to be taken off in , leaving only one train, the Copper Country Limited, between the Copper Country and Chicago via L'Anse, Champion and Iron Mountain.

It was stated in a recent magazine article that a locomotive belonging to one road was never operated over the railway tracks of another road. This is not strictly true. In the case of the Northern Michigan Special, a C.M.& St. Paul engine pulled the train into Houghton, using the Copper Range tracks from McKeever. Also for years a Copper Range locomotive pulled a train from Houghton to Ontonagon, using the St. Paul tracks from McKeever.

9. THE CHAMPION MINE

Exploratory work was begun in the spring of 1899 under the direction of Dr. L. L. Hubbard, formerly State Geologist of Michigan. In a short time, a rich showing of copper was found which led to the setting aside of 960 acres of the Copper Range Company's lands, together with 280 acres of the St. Mary's land to form the Champion Copper Company, each of the contributing companies owning one-half the capital stock. This discovery was made by Dr. Hubbard and Mike Messner in the bed of a stream near the present site of the Painesdale depot. Previous to this discovery a camp, called Camp No. 1, had been built in the N.W. quarter of Section 30, T.54 N., R. 34 W. on the extended strike line of the Baltic lode. Then the work at Trimountain, which lies between the Baltic and Champion, indicated a decided change in strike. Hence the search farther east. The first dwellings were built in 1899 and the town was called Painesdale in honor of Mr. W. A. Paine who was president of the company. Later, from time to time, more houses were built and water and sewer systems were laid out. In 1903 a fine library was built with a hall on the second floor for dancing and other entertainments. The library was donated by Mr. Paine and was named the Sarah Sargent Paine Memorial Library in honor of Mr. Paine's mother, a large portrait of whom can be seen in the reading room. The building is of Portage Entry red sandstone and was designed by Mr. A. C. Eschweiler, of Milwaukee. Near the library is a frame school house, built about the same time. In 1907-08 a new high school was built, also of red sandstone, and the frame building then became the grade school.

These buildings were heated by steam from the mine boilers.

Mention should also be made of the Finnish Hall, erected by the Finnish Temperance Society and used for all their functions. It was also used for some years in which to hold the precinct elections. This building was sold and wrecked in 1944 and is now a barn on a farm east of Painesdale.

The dispensary and doctors' office was located near the company boarding house on what is now Ogima Avenue. In 1912 a new dispensary was built at the top of the hill near Kearsarge street, and the old building became an annex to the boarding house, which was known as Camp No. 2.

When Painesdale was first laid out, the main streets were named alphabetically after mines or prominent mining men, beginning with Adams street at the north end of the town. Then came Baltic, Concord, etc. As more streets were added, similar names were selected. The streets at the Baltic and Trimountain locations were numbered, the avenues running north and south and the streets running east and west. Of course, there was a Stanton avenue at both Atlantic and Baltic. At first the Atlantic streets had no names and the houses were numbered as built. This caused confusion so recently these streets were named and the houses have been re-numbered.

Dr. L. L. Hubbard was manager of the Champion Copper Company and Mr. F. W. O'Niel was his assistant and chief engineer. When Mr. O'Niel left to go with the Ingersoll-Rand Company, Mr. R. R. Seeber became chief engineer. He left in 1906 to become superintendent of the Winona and was succeeded by the writer. Mr. Seeber is now professor of mechanical engineering at the college at Houghton.

The Champion stamp mill was built on the shore of Lake Superior, three miles west of the Salmon Trout river and the mill location was named Freda.

Water for the mill was pumped from the lake through a tunnel 1,000 feet long. In time stamp sand began to choke the intake and much trouble resulted from ice in winter. So, in 1912 it was decided to sink 60 feet deeper at the outer end of the old tunnel and drift 700 feet farther out to a pre-determined point for a new intake. At this point a drill was driven down into the sandstone lake-bottom deep enough to be intercepted by the new tunnel, the crew-men working from a scow. When the drill had been driven deep enough, a long pipe was attached to it so as to project above the surface of the lake. This was located by a triangulation survey from the shore and the survey was carried down the old shaft and out through the crooked old tunnel, with water running a foot deep along the floor. This water came in from the lake through cracks in the sandstone and was kept down by two No. 11 Cameron pumps located at the shore end. In the meantime, water for the mill was obtained through a temporary pipe to the lake. Then a new shaft was sunk 60 feet deep at the outer end of the old tunnel and a short drift was started. Plumb-lines were hung in this shaft and tied in with the tunnel-survey and the direction of the new tunnel computed so as to hit the drill 700 feet farther out. Line plugs were put in to guide the miners, new plugs being put in every week or so as the work progressed. All this survey had to be done with the instrument set up in ten or twelve inches of cold, running water. When they had drifted about far enough, the mill superintendent, Mr. Edward Koepel, became rather doubtful as to whether the tunnel would hit the right spot. He said to the engineer: "Damn it, Harry, according to my measurements, we should have been there this morning, but no drill yet." The engineer replied: "Well, Ed., they must have just blasted another cut; let's go down and see what they have got." They went down into the tunnel and, sure enough, there was the steel drill sticking down in the center of the drift. The superintendent was delighted and he said: "Darn it, boy, you're right. You should have that survey framed and hung on the wall." It was later found that the actual center line of the tunnel came within one inch of the drill.

The Champion mine was rich at the top and the lode held its values to a greater depth than did either the Baltic or Trimountain, especially toward the south end, but it, too, became poorer and the rock was badly broken or crushed, requiring much heavy timbering. The mine reached a total depth of 5,600 feet, had 348,339 lineal feet of drifts and produced 760,819,473 pounds of copper. It was closed in September, 1945 due to market and labor troubles.

10. THE TRIMOUNTAIN

The Trimountain Mining Company was organized and started work in 1899. This mine lies between the Champion and Baltic and was one of the Fay group, Mr. H. F. Fay, of Boston, being the president.

The country was wild and covered with forest. The only communication with the outside was by the so-called military road running from Houghton to Ontonagon. Incidently, this road was surveyed in 1858 by the late Mr. E. J. Hulbert, who was associated with the discovery of the Calumet and Hecla Conglomerate.

The first stamp mill site was acquired on Portage Lake in Section 20, T.54 N., R.33 W. and a survey was made for a railroad to the mine, but this site was not used. The mill was finally built on Lake Superior, about 2 miles west of the Salmon Trout River and the mill location was named Beacon Hill. Water for the mill was pumped from the lake through a large pipe laid in a trench on the lake bottom, the intake end being protected by a heavy timber crib about 1300 feet out from the shore. This crib was washed away several times during heavy storms and much trouble was experienced with both crib and pipe due to ice-action in winter. Also, in time, the waste stamp sand from the mill accumulated farther and farther out, sometimes blocking the intake.

Therefore, in 1912, a tunnel was driven under the lake to a new intake point about 2,000 feet from shore. The survey for locating this tunnel was simpler than that for the Champion mill because it was a new tunnel and straight out from the shore, so no complicated triangulation was necessary.

In 1902 the mine buildings at Trimountain were of wood construction and the hoisting engines small geared affairs, good for a depth of 2,000 feet. The only houses were those located along what is now Seventh Avenue. There was a company store and a store warehouse and the mine office was located in one end of the mine supply house. This latter building still stands. Later the hoists, compressor, boilers and steel buildings were purchased from the Arcadian mine, which was closing down, moved to Trimountain and, with some minor alterations, erected at Nos. 1, 2 and 3 shafts. When No. 4 shaft was started, one of the steel rock-houses was placed there. In 1910, when No. 1 shaft was abandoned, that hoist and hoist-house were moved to No. 4 shaft and erected there at a total cost of $13,984.00. These hoists were 32" x 72" Nordberg duplex engines, direct-connected to half-conical drums 19 feet in diameter, capable of hoisting a 10-ton load from a depth of 5,000 feet. The engineering work connected with the installation of these plants was most interesting.

Captain James Chynoweth, better known as Cap'n Jim, was superintendent at Trimountain. He was one of the most colorful characters in the Copper Country; a rugged, practical, old-time Cornishman without college training, but an excellent underground man and one of the salt of the earth. He always wore white mining clothes and it was said that he could spend a day in the mine and come up looking cleaner than any one else. Many amusing stories were told about this grand man. My first meeting with him was unique. He was on the office steps one day as I came along. He stared at me with those keen, blue-gray eyes and said: "Are you Jim Mercer's son?" Somewhat fearfully I replied: "Yes, sir." He said: "All right, son, do a good job." Then he turned abruptly and went into the office.

Capt. Jim lived at Calumet where he was in charge of two other mines of the Fay group and only came to Trimountain once or twice a week, so much of the business was done over the telephone. A story is that one morning he called up Capt. Tom Rapson at Trimountain and the following conversation took place:

Capt. Jim: "Ello, Tom. Any copper on ten level today?"

Capt. Tom: "Yes, Cap'n. Lookin' pretty good."

Capt. Jim: "All right, send 'er up. Good bye."

And the copper sure <u>did</u> come up in those days.

It was decided to build 40 or 50 new houses at Trimountain along what are now Fifth and Sixth Avenues. The chief engineer, Mr. John Knox, and I went out with Capt. Jim to look over the site, expecting to receive some detailed instructions about the job. We went to the top of the hill where the hospital now stands. Capt. Jim gazed out over the place, swung his arm in a wide arc and said: "All right, Knox, we'll put the 'ouses in 'ere." Then he walked away, leaving it all to us.

Mr. John Knox, chief engineer at that time, was not only a capable engineer, but he also had considerable executive ability. He left in 1903 to become superintendent of a mine in New York state. Later he returned to the Copper Country as general superintendent of the Calumet and Hecla Company, holding that position for several years. Then he became general manager of the Hollinger mine in Canada, which position he held until he retired in 1944.

The clerk at Trimountain, Mr. John M. Wagner, was a man of great ability, not only as a mine clerk, but in business affairs generally, all of which was combined with a keen sense of humor and he was liked and respected by all his associates. In 1904 he was made purchasing agent for all the Copper Range properties with an office in Houghton and was succeeded at the mine by Mr. B. D. Noetzel. Later Mr. Wagner became Assistant Treasurer of the company and Mr. Noetzel was made Purchasing Agent. Mr. Noetzel has excellent business ability and has also written several interesting articles on the copper industry of Michigan. Here are two men who certainly know how to run an office.

Although Chas. W. Bottsford was not with this company long, he did do some of the early surveying at the mine and was associated with other mines of the Fay group for several years. Charlie was a careless appearing fellow, apparently easy-going, but as sharp as a steel trap. In the field he could keep two rodmen on the jump and get an amazing amount of work done. One day a letter came from the president, Mr. Fay, asking for certain measurements at one of the other mines when the engineers had time to get them. Several days elapsed and Charlie's assistant said: "Charlie, shouldn't we go over and do that work?" Charlie replied: "Well, you saw that the letter said to get it when the engineers got time." Of course there had been plenty of time, but two more days went by before he ordered a team and carriage and they went over and made the survey in about an hour. Later Mr. Bottsford was geologist for the Inspiration Copper Company in Arizona, where he died a few years ago.

Mention should be made of Fred Sagemueller, one of the best stone-masons in the country. Fred could read a blue-print with the best. All that was necessary was to hand him the foundation plans for a complicated hoist or compressor, give him the center lines, and the job would be done with very few questions or instructions.

In those early days, many of the underground men were Cornishmen and some amusing stories are told about them. It is hard to express on paper how these men talked, but here are a few stories that come to mind.

Two "Cousin Jacks" were standing on a corner when a graceful, pretty girl passed by. One of them turned to the other and said: "Damme, Pardner, look at she; don't tell we 'er can't walk."

One day the captain entered a stope where two miners were at work. "Well, boys," he said, "'ow's she goin'?" Jan said: "Not so good, cap'n; bloody rock is too 'hard. Us can't make nawthin' in this 'ere place." The Capt. said: "Oh, that's all right, boys. All you need is patience and perserverance and you'll be O.K." After he had gone, Bill said to Jan: "Patience and perserverance, who be they?" Jan said: "I doan knaw. Maybe 'e do mean they two Finlanders dawn on next level."

One day, while reading, Jan came across the word "category" and said: "Locky 'ere, Bill, what do c-a-t-e-g-o-r-y mean?" Bill said: "Well, m'son. I'll tell 'e. When I do come on a word like that there, I do take un apart and analyze un. Now, c-a-t, any fool do knaw that spells cat; e, that means it's an 'e one. G-o-r-y means bloody. Damme, pardner, the word do mean a bloody tom-cat."

Here's one that actually happened at Trimountain. James T., better known as "Jimmer", was a miner. He loved not wisely but too well and finally married the lady. Of course, everyone knew about the affair. Well, after about 5 months a son and heir was born. Now "Jimmer" was very proud of his little family. One day a large crowd was waiting at the depot for the train to Houghton, when here comes Jimmer, his derby hat on one side, a cigar cocked up in one corner of his mouth, pushing the baby buggy with his wife following close behind. Just then there was one of those sudden quiet spells that sometimes occur in crowds and a Cousin Jack called out: "Thas right, Jimmer. Tram your own dirt." The roar that went up fairly shook the depot windows.

In those days the mines all paid once a month on the same day and there were six or eight passenger trains a day to and from Houghton. The trains were usually crowded and sometimes fights occurred.

Just before the three mines were consolidated the mine captain at the

Trimountain was Richard Bowden, a man with a sense of humor and a ready tongue. One day the engineer told him that one of the rich upper stopes south of No. 1 shaft had gone over the boundary line into Champion territory. Capt. Bowden said: "Yes, we needed some poor rock for fill so we went in there to get it."

Alf Gregor was a timberman at the Trimountain. Once he put in a plug to be used in extending the shaft-line downward. It was found to be off line and the engineer asked him how he located it. Alf said: "Oh, I hung a plumb bob on a long line from your last plug, climbed up the ladder and let 'er go. Where the bob struck the 'anging I put 'er in." Another time the engineer noticed that a temporary nail he had put in to mark the line seemed to have been disturbed. When asked about it, Alf said: "Yes, I took that plank up to make some repairs, but I put 'er back again right where she was." Probably only an engineer will appreciate this anecdote.

Will Tressider, timber boss at that time, was an expert at this work. When he lined in a plug, even 200 feet down the shaft, the surveyors' line would nearly always strike it.

Another ready answer is illustrated by the following: One day several noted geologists were visiting the mine, accompanied by the manager and the mine captain. They came to where the drift had encountered a large fault and a very scientific argument arose as to which way the lode had been displaced. Finally the manager turned to the captain and asked: "Captain, what do you think?" The captain replied: "Well, Mr. Denton, I think she is either in the futt or in the 'angin'."

The Medical Department

The Copper Range Hospital is situated on a hill at Trimountain at the south end of Fifth Avenue. The site affords a beautiful view to the east across the country to Keweenaw Bay and the Huron Mountains. This building was erected in 1902-03 for a superintendent's residence, but Capt. Chynoweth never lived there, as he was succeeded by Mr. F. W. Denton before it was quite completed. Mr. Denton occupied it until he moved to Painesdale. Then the building was remodeled for a hospital which was formally opened in the fall of 1905 with appropriate ceremonies. Later a nurses' home was built and connected to the hospital by a tunnel.

The first chief of staff was Dr. W. K. West. He was a good physician and surgeon and, although somewhat autocratic in manner, was well liked and respected. When under his care there was no doubt as to who was boss, which was what the people liked. Dr. West was noted not only for the excellent care he gave his patients but also for his careful follow-up during convalescence. Dr. West resigned in 1928 and was succeeded by Dr. L. E. Coffin. (Quite a good name for a doctor in Painesdale!) Although a quiet, reserved man, Dr. Coffin was an excellent surgeon and a fine administrator. He left in 1945 when the mines and hospital were closed. This hospital was a very high-class institution and it was a great blow to the community when it had to be closed.

Like the Champion and Baltic, the Trimountain was rich at the top, becoming poorer with depth until it was finally closed in 1931. The mine reached a depth of 4,500 feet, had 150,563 feet of drifts and produced 148,799,669 pounds of copper.

11. SECTION 16 WORK

Exploration in Section 16, T.54 N., R.34 W. was started by the Atlantic Mining Company in 1897 on the extension of the Baltic lode just north of the Baltic mine. This work reached a depth of 2,300 feet and there were 6,300 feet of drifts, but little or no stoping was done. The ground proved unpromising so the work was stopped in 1910. 62,501 pounds of copper were taken out which is included in the Atlantic production.

Tables accompanying this article will give some details about the mines of the South Range and the production by years of the Copper Range mines.

12. THE GLOBE

The Globe tract consisted of Sections 1 to 5 inclusive in T.53 N., R.35 W. south of the Champion, owned by the John Stanton estate. Diamond drilling in 1901-02 in Section one located what was then thought to be the Baltic lode. Sections one and two were optioned to the Copper Range Company and early in 1905 surveys were made to extend the strike of the Champion workings southward across the Globe property. From these surveys and the diamond drill work, a site for a vertical shaft was located in Section one about 700 feet south of the Champion boundary line and far enough west so as to intercept the lode at depth.

The first shaft was started by using steel I-beam sets, with fir planks for lagging. The steel sets were hung from heavy steel beams across a concrete collar, or crib at surface. This method worked well until the water level was reached at a depth of 93 feet below the surface. Then the sets began to buckle and twist and the lagging planks started to fall out. Finally, this shaft was abandoned and a drop-shaft was started a little farther west in October, 1905. The drop-shaft was built of solid 14 x 14 inch fir timbers, protected by a steel plate shoe at the bottom and weighted to help force it down as the earth was dug out inside. As sinking progressed, new timbers were added at the top. After reaching the water level the ground around the shaft began to crack and cave to a distance of from 50 to 70 feet from the shaft. When this ground did not move, the shaft would hang up and refuse to drop. Steel sheet-piling was tried for a short distance without much success. Then the shaft was reduced in size and hydraulic jacks used to help force it down. At a depth of 144 feet a layer of sandstone 4 feet thick was encountered. After passing through this there was more quick-sand. The shaft became crooked, and even twisted around some 5 or 6 degrees, and progress was very slow. Finally, after many difficulties, the ledge, or solid rock, was reached in May, 1907, at a depth of 225 feet below surface. Three more months were required to seat and seal the shaft before sinking in the rock was begun.

The first level was started at 341 feet below the surface and a cross-cut run east to intersect the lode, which was found to contain a little copper. The shaft was sunk to a total depth of 1,000 feet, intersecting the lode at about 800 feet. At 1,000 feet the seventh level was started and about 1,100 feet of drifting was done disclosing little of value, so the work was stopped in 1909.

In 1929-31, new diamond drilling and a long exploratory drift on the ninth level from the Champion indicated that the real lode had been faulted, or thrown some 800 feet to the west. Therefore, in 1935, it was decided to re-open the old Globe shaft. Of course, having been abandoned for so many years, the top of the old shaft had caved and filled up and all reference points were gone. So new surveys had to be run out from the Champion to relocate the center of the shaft. This was done and a new circular, concrete drop-shaft was started in December, 1935 to come down on the old timber shaft at water level, below which the old timbers should be in good condition.

The concrete shaft was 24 feet in diameter, with walls 2 to 3 feet thick, reinforced with one and one-half inch steel rods. In April, 1936, at a depth of 105 feet, the old timbering was found to be in excellent condition.

The old shaft was un-watered and repaired and the Champion ninth level was connected to what had been the old Globe seventh level. A sub-shaft was sunk further south to the 18th level and an electric hoist installed over this on the 9th. The 18th level was driven through to connect with the Champion. Considerable drifting and stoping were done on both levels in the newly located lode, parts of which were rich in copper. All the copper rock was trammed over to the Champion and hoisted at No. 4 shaft. The waste rock was hoisted at the Globe shaft.

The engineering connected with this project was an extremely interesting job, in which the writer was fortunate to have had a part.

13. THE STRIKE OF 1913

On July 23, 1913, the Western Federation of Miners called a general strike of all its members employed in the mines of the Copper Country, thus throwing out of work some 14,300 men. The Copper Range Company alone employed 2,716 men at the time.

The principal demands were:

1. Recognition of the Western Federation of Miners.
2. Abolishment of the one-man drill.
3. Wage increases.
4. Establishment of an eight-hour day.

It was also claimed that the men were not treated with justice and decency by the petty bosses and that they had no adequate means of presenting their grievance to the managers without incurring the displeasure of the bosses. There was also some criticism of the living conditions at the mines, mostly voiced by those not familiar with those conditions.

As an investigation of the strike was quite fully written up at the time in a report by the Copper Country Commercial Club, only a few of the highlights will be mentioned here.

All the managers in the district at once announced that under no circumstance would they recognize the Western Federation of Miners because of the record of bloodshed and violence that accompanied every labor dispute in which the Federation had taken part.

The one-man drill, being easier to handle and much more efficient than the old-two man machine, actually resulted in higher wages for the miners. Also, it had been accepted in other districts with no complaints.

Wage adjustments and a possible 8-hour day were already being studied before the strike and plans were under way for a possible solution of these matters.

Most of the company dwellings were substantially built frame houses with good basements, free running water piped into the kitchen, a barn and ample space for a garden, all for a rental of $1 per month per room. For those preferring to build and own their own homes, a good-sized lot was provided at 6 dollars per year. Also, there were good schools, churches and adequate rail connections with the larger towns. Considering all these things, the reports on poor living conditions seem grossly exaggerated.

Almost from the beginning the strike was accompanied by violence and some bloodshed. Three men were killed at Painesdale, two of them while they lay in bed by rifle shots fired at random from the near-by woods. The sheriff's force was totally unable to cope with the situation, so finally the State Troops were called out and companies were located at the various mine locations. The troops at the Copper Range mines had their main camp back of the library, from which guards were posted at various strategic places and passes were issued to all persons having legitimate business around the mine. Most of our people were law-abiding and peaceable, although some were misled and aroused by the strike leaders, especially during the parades, which were usually staged in the early morning. Of course, some amusing things occurred. One dark night a soldier posted near the mine office heard someone approaching. He challenged: "Halt! Who goes there?" A small, scared voice answered: "It's only me." It was one of the women returning from a late visit with a neighbor. Another guard, showing his rifle to a lady friend, accidently discharged it. The shot brought an officer and that soldier spent the next day in the guard house.

When things had quieted down, some of the troops were gradually withdrawn and outside men from the Wadell Agency were brought in to help keep order. Now, the people understood and like the soldiers, but did not like the Wadell men, who were a more or less rough bunch, apt to use their clubs at the slightest provocation. Their leader was a devil-may-care fellow, afraid of nothing. He rode a horse on his rounds and would charge right into a parade of strikers, dispersing it single-handed. One day the manager asked one of the engineers to go to a certain house and make a sketch of the room in which a shooting had occurred, showing where the bullets had entered the walls. This was for use in court. The Wadell leader offered to send a couple of his men along, but the engineer said: "No, I prefer to go alone. These people know me and there will be no danger." He got the information without any trouble.

Toward the end of the strike, when the mines were gradually beginning to resume operations, the managers would meet at times for luncheon and to discuss progress. One of the superintendents, Nick H., was quite a wit. At one of these meetings he was seated between Mr. C. L., who was a somewhat loud, bombastic talker, and Mr. J. M., who, at that time, did not partake of strong beverages. During a lull in the talk the chairman turned to Nick and said: "Well, Nick, so far you have said nothing about your mine. How come?" Nick replied: "Well, seated here between wind and water, what can I say?"

Finally some of the good citizens of Houghton and Hancock got sick and tired of the situation. They called upon the Federation leader at his hotel, escorted him to the depot and put him on the train for Chicago with very definite instructions not to return. Some of us wished that we had been informed of this so we could have given him a suitable send-off as the train went through Painesdale Of course, this caused an uproar among the strike leaders, but it soon died down and things soon returned to normal.

14. COPPER RANGE CONSOLIDATED COMPANY

The Copper Range Consolidated Company was organized in 1901 as a securities holding company, owning stock in the Copper Range Company, Atlantic, Baltic and Trimountain Mining Companies, The Copper Range Railroad Company and a half-interest in the Champion Copper Company. The Consolidated was dissolved in 1915 and replaced by the Copper Range Company on a share for share basis. The Company later acquired the St. Mary's Company's lands and the other half of the Champion. More lands were acquired from time to time until the Copper Range Company now owns approximately 156,000 acres of mining and timber lands, extending all the way from the end of Keweenaw Point to the south end of Ontonagon County. A list of these lands follows:

South Range Mining Company
Atlantic Mining Company
Champion Copper Company
Trimountain Mining Company
Baltic Mining Company
Michigan Smelting Company
Wheal-Kate Lands
White Pine Mining Company
Naumkeag Mining Company
Victoria Mining Company
St. Mary's Mineral Land Company
Mohawk-Wolverine Lands
Bohemia Mining Company
Douglass Copper Company
Michigan Copper Company
Boston & Lake Superior Mineral Land Company
Hulbert Mining Company (indirectly)
Globe Mining Company
Lake Copper Company
Houghton Copper Company
Fulton Lands

Much of this land supports fine stands of hardwood, with some white pine, spruce, hemlock, etc. The coloring of this forest in the fall season is something glorious to behold. Much of this timber is being logged off, but selective logging is practiced as far as possible so as to save the young trees. Also the second growth is coming up quite rapidly. Forest fires take some toll in the softwood areas, but do little damage to the hardwood timber.

Several years ago, there was a very dry fall, lasting up into November. Fires started all around, the largest being out to the south, near the Globe. At night it looked very threatening, with the glare reflected up in the smoky sky. Some people became frightened. One lady even went so far as to don several dresses and get things ready to move out. Upon investigation the fire proved to be quite low, 6 to 12 inches high, burning the dry, fallen leaves, but doing little or no harm to the hardwood timber. It looked like a long skirmish line advancing slowly through the forest and was quite a beautiful sight. Once in a while the fire would reach some dry brush, flare up for a moment at that point, and then drop back to its slow advance among the leaves.

It was decided to let it burn until it reached the F ravine where the forest ended and there was little to burn. The fire reached the ravine early the next morning and most of it promptly went out. It was only necessary to watch the nearest buildings and other vulnerable spots. Luckily there was little or no wind.

One result of this fire was noteworthy. That year there had been a prolific crop of maple seeds. The burned-over ground was ideal for these and the next year the whole area was covered with a thick carpet of little maple trees. The effect was very beautiful and lasted for several years until the little trees got to be a foot or more in height and some died out. Even today it is still beautiful in places.

At first all matters connected with the lands and timber were in charge of the local company officials. After the St. Mary's lands were taken over and other lands acquired, reaching all the way from Keweenaw Point to Lake Gogebic, in Ontonagon County, this part of the business was so greatly increased that a land department was organized, under Mr. John M. Wagner, of which department Mr. William A. Maara is the forester. Timber is sold to logging contractors on a stumpage basis and the trees are cut according to selection by the forester, so as to save the young growth as far as possible. Cull trees and the larger branches from the cutting are sold to company employees at 50 cents per cord, the people cutting up the wood and hauling it home for fuel. They call this making wood. Of course, this applies mostly to those areas which are fairly close to the towns. The coming of electric ranges has curtailed this practice somewhat, but some wood-making is still being done and some of the wood piles in the yards are beautifully symmetrical, especially those piled by the Italians and Croatians. Some of the cut-over lands are leased for farming.

A recreational program has been started. Lake shore lots will be laid out and leased for the building of summer camps and cottages and roads will be bulldozed around the lakes to give access to the lots.

15. THE PAINES

Mr. William A. Paine, President of the Copper Range Company from its beginning to 1929, was concerned with the development of the Copper Country for many years. From 1873 to 1880 he held a position with the Blackstone Bank of Boston, Mass. Then, with W. G. Webber, he formed the brokerage firm of Paine, Webber and Company. Mr. Paine was a keen business man and understood the details of mining well. He had the interest of the community at heart and contributed a great deal towards its welfare, an outstanding example being his gift of the Sarah

Sargent Paine Memorial Library, named for his mother. This building was not only used as a library but was also the social center of the community where dancing parties and other gatherings, private and public, took place. Mr. Paine visited the mines once or twice a year, sometimes accompanied by members of his charming family. His death on September 24, 1929 left a great gap in the Copper Range family.

Mr. F. Ward Paine, son of Mr. William A. Paine, was a graduate of Yale. He was a keen student of scientific and business affairs and, like his father, took a deep interest in the Copper Range communities, manifested in many quiet ways. Ward, as he was known to his many friends, came to Painesdale in 1907 and spent the summer working with the surveyors. He was especially well grounded in geology and mining methods and in 1911-12 was an instructor in these subject at the mining college at Houghton. He became a director of the Copper Range Company in 1913, vice president in 1915 and was made treasurer in 1916. Although a serious man devoted to business, Ward was liked and respected by all his associates. His accidental death on August 22, 1940, was a definite loss to the company.

16. MR. DENTON

Mr. F. W. Denton was a graduate of the Columbia School of Mines. He first came to the Copper Country in 1890 and for a time was professor of mining at the mining school at Houghton. Then he went to the Atlantic as assistant superintendent and was later made superintendent of the Baltic and Trimountain. He was also in charge of the Winona mine for a time.

In 1905, Mr. Denton was made general manager of the Copper Range properties. He served for several years as Supervisor of Adams township and was on the Board of Control of the Michigan College of Mines from 1921 to 1927.

Mr. Denton was one of the finest men it has been my privilege to know. Not only was he an excellent mining man, but he was well versed in many other matters. He could be stern on occasion, but was always just, and he inspired confidence among his associates and employees alike. He supervised all the work closely and was quick to make up his mind about any job. Combined with this was the rare ability to delegate work to the proper department head and, once having done so, he would back that man up, only changing the orders through him. He also made it a point to compliment a man on a job well-done or a good idea, which made for unity and good feeling. Working with him was a real pleasure.

One of Mr. Denton's outstanding contributions to the mining of steep lodes was the introduction of the dry-wall and filling system. Previous to this, practically all of the rock from the stopes was sent to the mill, leaving the stopes empty. Then it was decided to sort, or pick the rock, hoisting only that containing copper and leaving the poor or waste rock in the stopes for fill.

Walls of dry, handy rock were built along both sides of the drift. Across these walls timber logs called caps were placed about a foot or two apart. Upon these caps was placed the logging, usually split cedar or poles forming a floor upon which to start the stoping. As mining progressed, chutes, or mills, also built of rock like a well-curbing, were carried up at intervals of about 75 feet along the lode. The sorted copper rock was thrown down these chutes, at the bottom of which were aprons for loading it into cars on the level. When the stope had been finished to within 15 feet of the level above, it was nearly full of waste rock, which served to prevent the caving or falling in of the stope walls and also provided a base upon which the miners worked. When the waste rock was not sufficient to provide the required amount of fill, waste sand from the stamp mill was brought up in railroad cars and dumped down through raises put up for that purpose. In the stope this sand was fed from the raise into a closed iron tank and blown by compressed air through pipes to the desired place. These walls and chutes were quickly and beautifully built by the wallers, who were usually Italians. The sorters, or pickers, became quite expert in judging the rock and very little copper was lost in the fill.

In 1917 Mr. Denton resigned as general manager and was succeeded by Mr. William H. Schacht, who had been asst. general manager since 1912. Mr. Denton moved to the eastern office and was vice president and director until he retired in 1924. He returned to Houghton every summer, where he maintained his summer home, and always took a keen interest in mining and community affairs. He died in 1942, deeply mourned by the whole Copper Country.

17. MR. SCHACHT

Mr. William H. Schacht was a graduate of the Milwaukee schools and, for a time, taught manual training in the Ishpeming high school. He graduated from the mining college at Houghton in 1911 and went to work at the Copper Range stamp mill as assistant to the superintendent, Mr. Koepel. His ability and close attention to details were soon apparent and he was made assistant general manager in 1912 and moved to Painesdale.

Here was another man of fine character and a thorough gentleman with a superb knowledge of engineering, combined with a keen insight into world affairs generally. His love for engineering design was so great that he began taking altogether too many of the small details upon his own shoulders, details which could very well have been left to others. In the design of a rock-house, crushing plant or other such work, he was always thinking up better ways of doing things and was apt to change the plans overnight many times. Of course, this often resulted in economy, but it was exasperating to his engineers and draftsmen. He would have made an excellent inventor or designing engineer. Although Mr. Schacht was very sure of his own ideas, and would defend them with vigor, he also enjoyed honest opposition and criticism, sometimes giving in to a man who would stand up to him and talk back. Few of his associates would do this, but when anyone did, some lively and amusing arguments took place. One day he was discussing some repairs to his house with a contractor friend and said: "Now, Herman, let me see. I don't remember just how those rafters run up there." Quickly Herman replied: "Damn it, Bill, if you stayed home more nights instead of working down here at the office all the time, maybe you would know more about your own house."

When the addition to the high school was being built in 1933 by this same contractor, Mr. Schacht took a keen interest in the job and could hardly stay away from it. One day he laid out a scheme for some scaffolding to be used in erecting the ceiling of the natatorium and sent it up to the job by the engineer. The foreman of the job, a man of many years experience, looked at the sketch and said: "Now, this is very nice, but I tell you what. You and Mr. Schacht just go fishing for a few days and forget all about it. We will get the ceiling up all right."

One of Mr. Schacht's outstanding contributions to plant economy was the installation of regenerators, making possible the use of exhaust steam from the hoisting engines for heating the various mine buildings, schools and library. Previous to this these buildings were heated by live steam from the boilers which was very expensive. The regenerator is a large, closed steel tank of some 1,200 cubic feet capacity, partly filled with water, with baffle-plates and perforated tubes for distributing the exhaust steam through the water and a suitable connection with the heating main.

Briefly the operation is as follows: When the exhaust steam received by the regenerator exceeds the amount it is delivering to the heating system, the water in the regenerator absorbs the excess and holds it until some time when less steam is received than is required. When the steam received is just equal to the demand, the pressure within the regenerator is constant, no steam is condensed and the regenerator floats idle. Should the quantity of incoming steam be less than that required by the heating system, the pressure in the regenerator falls and the water gives off steam, losing the heat that was absorbed during the excess. In other words, the regenerator is a device to store up heat for use when needed.

In order that the operation of the engine and heating system may be independent of each other, a relief valve, located in the exhaust steam path, limits the range of pressure in the regenerator. Provision is also made so that live steam may be automatically admitted to the heating system when needed.

The use of these regenerators resulted in a saving of 8,000 tons of coal per year to the Copper Range Company. This system is fully described in a paper by Mr. Schacht published in the transactions of the American Institute of Mining and Metallurgical Engineers in 1920.

Mr. Schacht designed the rotary impact crusher for use at the stamp mill, where one crusher replaced four of the old steam stamps. He was also a leading figure in the development of the Ontonagon river water power project, resulting in the formation of the Copper District Power Company of which he was president.

When it was decided to develop the White Pine property, Mr. Schacht worked out a method of mining and complete plans for a hoisting plant and mill. In this work he was ably assisted by Mr. John Vitton, who, for some years, was assistant to our mill superintendent, Mr. Andrew Engels, at Freda.

As a member of the Board of County Road Commissioners, Mr. Schacht was responsible for many of the road improvements in Houghton County. He was connected indirectly with the re-opening of the Isle Royale mine and took part in many other activities throughout the county.

In 1930 he was made president of the Copper Range Company and continued as president and general manager until his death in 1944. In recognition of his achievements, the honorary degree of Doctor of Engineering was conferred upon him in 1940 by the Michigan College of Mining and Technology, on the Board of Control of which college he had served for several years. His sudden death on September 29, 1944, was a great loss to the whole Copper Country.

18. OTHER CHARACTERS AND STORIES

Captain John Jolly was head mining captain and later underground superintendent for several years. His judgment in underground matters was good and he contributed much to the successful application of better methods of mining. Capt. Jolly resigned in 1927, going to Detroit to be near his sons. He died in 1935.

John Angove, carpenter foreman for some years, was one of the best mine carpenters in the country. He could design structures and was responsible for the development of the so-called Angove dump for inclined shafts in use at all the Copper Range mines. He also built the Odd Fellows Hall and theatre at Painesdale.

Joe Connelly was surface boss at the Champion. Joe could get more work out of men and teams than most bosses. He had a prodigious vocabulary of profanity, but it was accompanied by a twinkling grin so no one minded the cussing. One summer Connelly re-graded the road now known as Ogima Avenue leading from the dispensary to the post-office, surfacing it with crushed rock. After a year or so the surface began to wear down, exposing some of the larger rocks. One day Dr. West drove by in his buggy, called to Joe and said, in his somewhat imperious way: "Connelly, that road is getting pretty bad. Some of the rocks are sticking up and something should be done." Joe came over, leaned on the buggy and replied: "Now, Doc, I tell you what. We'll give you a file and you can file 'em down a bit."

About that time we were doing our own timber cutting, hauling the logs in with teams. Sometimes a heavy load would stall and the driver could not get it going. Then Joe would come along. The minute he took the reins and spoke to the team, those horses would get down to business and the load usually started. Perhaps Joe's vast vocabulary had something to do with it, but he certainly knew horses.

Old Hugh Dunstan, known to all as Uncle Hughie, was a lander, or bell-ringer at one of the shaft houses. One day the skip was delayed at surface for some reason. The mine captain called up on the telephone from underground and said: "Hey, Uncle, where's that there skip to?" Uncle Hughie replied: "Fast to the end of the G.. D... rope; where the H... did ye think she was?" One election day Uncle Hughie came in to vote. Capt. Jolly, who was on the election board, greeted him with: "Good morning, Mr. Dunstan." Uncle Hughie said: "Huh. Election time it's Mr. Dunstan. Any other time it's that old bugger."

Dick E. was night watchman at the Champion for several years. He was always telling about the love-making and other things he saw, or imagined he saw, on his nightly rounds and usually ended up by saying: "And if I waz ta tell ee who they wuz, you wad be sur--prized." He later went to Detroit and was a sort of day watchman around one of the large office buildings. Some one said: "Dick, don't you find it pretty hot here in summer?" To which he replied: "Well, m'son, theers foor sides to the buildin'."

Mr. and Mrs. Patrick Moore were real, old-time Irish people. Paddy, as he was known, was one of the first night watchmen at Painesdale. He was a loyal employee, well liked by everyone, but somewhat gruff in manner, and some of the men liked to have fun with him. If such a person said: "Good evening, Mr. Moore. How are you today?" He would reply: "None tha better fer seein' you, ya spalpeen."

A captain at one of the mines was leaving, so a dinner was held in his honor and the men bought him a watch as a farewell token. One of the shift-bosses was selected to make the presentation. When the time came, he was very nervous and forgot his prepared lines, so he arose and said: "Cap'n, 'eres the bloody watch; we got un fer you; 'ere, take un."

19. EARLY VEHICLES

In the early days, up to 1911, there were no motor vehicles. All surface work, such as hauling, grading, etc., was done with horses, several teams of which the company maintained. There were also driving horses for use by company officials. Wagons and buggies were used in summer; sleighs and cutters in winter. Joe and Dolly, matched grays, were used both as a carriage team and singly. Dolly was a dear, willing horse; Joe was inclined to be lazy. Then there was a black horse called Cub, who was apt to loaf on the job, especially when going away from the barn. Jess was a high-spirited, roan, needing a firm hand on the reins, but she could cover the ground at an amazing rate. There were others whose names do not come to mind. Of course, among the work teams, there was always a "King" and "Queen". These fine animals did their full part in the development of the Range.

The barn boss was Henry Hart, a French-Canadian, who understood horses and took great pride in their care. He could not say Mercer, so addressed the writer as "Mr. Marcy". From this Mrs. Mercer got her nick-name of "Marcy". There was a night man at the barn and horses were available at all times for company business.

About 1911 Mr. Denton got an Olds touring car with very large wheels, and in 1913 the writer bought a Model T Ford which could travel at 25 or even 30 miles per hour! From then on, more cars were acquired, together with motor-trucks and tractors, and the use of horses was gradually discontinued.

At first the roads were none too good. In winter a big, horse-drawn double roller kept the snow packed down on the main roads. Later the roads were improved and motor-driven snow plows introduced, so now the roads are passable for automobiles at all times. Once in a while, during a heavy storm, they become blocked for a day or two, but they are soon cleared by the powerful plows.

Mr. Caesar Luchessi, of South Range, secured a tractor-driven, rotary plow and kept the main road from Painesdale to Houghton open long before the county had its equipment. He would even call his crew out at night to open the road in an emergency. Mr. Luchessi really showed the way and deserves much praise for his foresight and enterprise.

During the past 19 winters the snow-fall at Painesdale has averaged 156 inches. The highest was 231 inches during the winter of 1942-43 and the lowest 113 inches in 1930-31. The greatest depth on the level at any one time was 52 inches. A record of the precipitation and snow-fall has been kept by the writer for the weather bureau since 1926. September to May inclusive are considered the winter months, but on June 2, 1945, there was a snow-fall of 7 inches! The first real snow-fall comes in November, but there is sometimes a little in October, usually a trace or perhaps an inch or two. The temperature rarely goes below minus 10 degrees, but sometimes reaches 25 degrees below zero in places.

Although the average depth of snow on the level rarely exceeds 4 feet, high winds sometimes make drifts 8 to 10 feet high. Years ago, during a March storm, before rotary plows were used, a rock train got stalled in a deep cut near Mill Mine Junction. A locomotive was sent out to help and it got stuck. Another engine was dispatched to the scene and it too became stalled. The snow continued to drift in until it was possible to walk on the snow right across the tops of the locomotives. Finally a crew of men was sent out from the mines to dig them out with shovels.

20. GARDENS AND YARDS

Among the principal activities in the Range towns was the planting of vegetable and flower gardens. Up until about 1932 all the yards were fenced in because many people kept cows which ran the roads and were a nuisance generally. These fences had to be kept in repair and, as this was done mostly by the tenants, the appearance was pretty ragged, to say the least. Then, in 1932, cow pastures were fenced-in by the Company and all persons owning cows were required to keep them in these pastures during the summer. People were advised to remove their fences and improve their yards and many did so. To further encourage this, prizes were offered for the best looking yard and for the best vegetable garden, the judges being some one not in the Company employ, usually the county agricultural agent and two others. Company officials were not eligible for the contest. These contests were kept up for four or five years, resulting in some very fine gardens and beautiful yards, even in unpromising places.

Two of the yards were so outstanding as to deserve mention. Henry Kallio, a miner, lived at 176 Evergreen Street. He had a lawn that was like green velvet, with trees and shrubbery around the sides and all on a hill that was nothing but hard-looking clay at the start.

Joseph Bonneau, one of the blacksmiths, lived at 140 Kearsarge Street. His lawn, partly on a side hill, was a little green gem greatly admired by many people, as it was a corner lot on the main highway. There were others too numerous to mention and many excellent vegetable gardens. The keeping of animals and chickens was encouraged and counted heavily in the scoring of the contest.

21. THE WATER SYSTEM

Water for domestic use was at first obtained from wells. Dams on nearby streams supplied water for the mine boilers and for cooling the air compressors.

Need for a more adequate domestic supply was soon apparent, so surveys were started in 1902 for a pump station on the Pilgrim river, half a mile east of Trimountain, and an 8-inch pipe line from there to the mine. Cast iron pipes were laid along the principal streets and a 100,000 gallon steel tank was erected on the hill north of Trimountain. At about the same time a water system was started at Painesdale and a 200,000 gallon steel tank had been erected on the high ground at the west end of Highland Street.

At first it was planned to obtain water for Painesdale from Lake Perrault, about 3 miles west of the town, and surveys for a pipe line to the lake had been made. Further study indicated that this supply would be inadequate, so a pump station was built on a branch of the Otter river, about a half mile east of the town and a 5-inch line laid to connect with the system at E location, where there was a small wooden tank. Baltic obtained its water from a branch of the Pilgrim river near the mine.

About 1907 it was decided to connect all three mines with the same supply, so the systems at each town were extended and a 10-inch pipe line laid from Painesdale to Baltic, with the proper connections. A 100,000 gallon steel tank was placed on the line at 6 mile hill to reduce the pressure for Baltic, which otherwise would be too great for the Baltic pipes.

The village of South Range at first planned to get water from the hills west of the village and a dam and pipe line were built for this purpose. This supply proved totally inadequate. In fact, during dry seasons, there was no supply at all. So a 6-inch pipe was laid to connect with Baltic, and South Range now obtains its water from the Copper Range system.

In 1912-13 a new pump house and reservoir were built at the Otter Creek station and a 12-inch pipe laid to connect with the system near No. 4 shaft. The pump house was of concrete blocks with a red tile roof supported on steel trusses.

The reservoir was of concrete with a steel roof. The stream was led into the reservoir through suitable gates. The whole place was fenced in and one of the pump-men, being a good gardener, planted flowers and vines, making it quite a show place.

This brings up an amusing incident. One summer Mr. W. A. Paine was visiting the mine and, of course, was taken down to see the new station which was our pride and joy. While walking along the cat-walk in the reservoir, listening to Mr. Schacht explain things, we looked down and there, floating on the surface of the water, was a dead mouse! Of course, such things always happen when visitors are present.

After the above improvements were completed, the old Trimountain station was abandoned. Automatic mercury regulating valves were tried at Trimountain and at the 6-mile hill tank, but were not successful, due to too much variation in pressure at the supply end, so they were removed and the Baltic supply was regulated by hand. The Trimountain tank was shut off and Trimountain was supplied direct from the Painesdale tank.

The country south of Painesdale is covered with an overburden of sand, gravel and some clay which varies in depth from 60 feet at No. 4 shaft to 250 feet a mile south. This overburden is charged with water for a depth of about 80 feet above the rock surface, or ledge. In 1925 cracks developed at the top of the old workings above the third level, 3,000 feet south of No. 4 shaft. Water from the overburden above broke into the mine at a rate of flow of about 2,500 gallons per minute. This water ran down through the old workings and began flooding the mine, stopping all mining operations until it could be controlled. Fortunately, most of the water was caught on the sixth level and led out to the shaft where two No. 11 Cameron pumps were hastily installed. A large electrically driven Prescott pump was then installed and connected with a 10-inch pipe hung in the ladder road.

Two large, self-dumping bailers were built and placed in No. 1 shaft where they were operated by the hoisting engine, drawing water from the bottom. Tests proved the water to be pure, so it was decided to use it for the domestic supply. Also, the Otter Creek supply was inadequate, especially during dry seasons. Suitable connections were made at surface so that the sixth level pump could discharge into the system. As soon as this was accomplished, the Otter Creek station was closed down. Meanwhile plans were made to catch as much water as possible on the third level in order to save pumping expense. This was done by drifting around about 100 feet above the south end of the third level to intercept the water and then putting up raises and drill holes to tap the overburden above, plugging all openings as far as possible leading down from the third level. Finally most of the water was caught here and led out to the shaft through a 14-inch pipe. Then the Prescott pump from the old Otter Creek station was installed on the third level near the shaft and connected with the 10-inch column. A large, new Prescott pump was also purchased and installed here and connected by a 14-inch pipe to surface. This pump handled the excess water, which was mostly wasted. After these pumps were in operation, the sixth level pump was stopped and used only as a stand-by. Later a smaller electric pump was installed on the sixth level about 2,200 feet south of the shaft to handle the water that got past the third level, amounting to about 200 gallons per minute. This water was raised to the third level through a pipe placed in a long raise put up for that purpose. Later still, fearing that trouble might develop on the third level, a new drift was driven above the third level from the shaft to the source, a distance of about 3,000 feet, and water was led out to the shaft through this tunnel. This was called the second, or water level, and also served as a reservoir. From the shaft-end of this drift, the water was led down through a pipe to the pumps on the third level.

About 1937, the towns of Houghton and Hancock began looking for ways to increase their water supplies, so, as the Copper Range Company was wasting some

1,400 gallons per minute of perfectly good water, a project was put through to supply these towns from Painesdale. A 9-mile pipe line was built connecting with the Houghton system at the west end of the town and across Portage Lake to Hancock. Connection was made with the 14-inch pipe from the larger third level pump and the old 100,000 gallon tank was moved over from Trimountain and installed on the line near No. 4 shaft to act as a storage and equalizer. From there the water runs by gravity to the Portage Lake towns, which started using the water in 1938. Large meters at Houghton and Hancock measure the supply. At present, Hancock uses about 20 million gallons of water per month and Houghton uses about 17 million gallons. In 1941, a branch from this line was put in to supply the Isle Royale mine, and another branch to supply the Stella Cheese Company factory at Baltic. Thus there are two systems, one supplying the Range towns, called the high-pressure system, and one called the low-pressure system, supplying Houghton, Hancock, Isle Royale and the Cheese Company.

Laying the pipe across Portage Lake was quite a job. The pipe had to be placed at a certain depth to conform to U. S. regulations as to boat traffic in the lake. First, soundings were made to determine the nature of the bottom. Then a trench had to be dug in which to lay the pipe. This was done by means of a large scraper rigged with wire rope lines and pulled back and forth across the lake bottom by one of the Copper Range R.R. locomotives. After the trench was prepared, a diver was employed to lay the 12-inch pipe. The pipe was bolted together on shore in three 20-foot lengths at a time. Then, plugged at the ends, the three-length sectio was floated out and sunk into place. Then the diver went down and bolted the sectio to the ones previously laid. After the crossing was finished, water was run through the pipe and wasted on the Hancock side for a day or two to clear out any sand or dirt that may have gotten in while laying the line.

In December, 1942, a break occurred in the pipe under water near the Hancock side. One of the bolted joints had given away. The exact position of the break was located by forcing compressed air through the pipe. The air escaped through the break and bubbled up to the surface, even melting the 6 inches of ice above. A new joint was prepared and the diver went down in the icy water and made the repairs. The line to Hancock was out of commission for about a month. Mr. Bernard Manderfield, Superintendent of the Copper Range mines, was in charge of this work.

22. ELECTRIC POWER AND LIGHT - COPPER DISTRICT POWER COMPANY

The first electricity was furnished by small, steam-driven dynamos at each mine, the one for the Champion being located at No. 1 compressor house. In 1906, a larger unit was installed at F compressor plant and used until 1912.

In 1906, the Victoria Copper Mining Company built a Taylor air-compressor on the west branch of the Ontonagon River near the mine. This device makes use of a fall of water and entrained air down a shaft to a large underground chamber where the air collects and is compressed to about 117 pounds per square inch by the head of water in the outlet shaft. Once installed, there was little or no further expense for up-keep and enough power was furnished for both the mine and mill except in very dry seasons. This project is fully written up in Stevens Copper Handbook for 1910 and a drawing of the device included herewith is self-explanatory.

About 1910, an investigation was made for a possible hydro-electric plant on the Ontonagon River. This project proved too expensive because, in order to have enough water in dry seasons, the main river would have to be dammed. So steam turbines were installed at the Champion mill at Freda and a power line was built from the mill to the mines along the old Atlantic and Lake Superior R.R. Steel poles were used, set in concrete bases. A plant for mixing concrete was mounted on flat cars, drawn by the Copper Range R.R. light locomotive No. 52. This was the last train to be operated over the A.&L.S.R.R.

In 1923, further investigations were made along the west and middle branches of the Ontonagon River. More lands were acquired in this area and around Lake Cogebic, resulting in the formation of the Copper District Power Company, with Mr. William H. Schacht, as president. A large dam was built at Victoria on the west branch of the river. Water from this dam was led through a large, wood-stave pipe to a new power plant about a mile farther down the river where two turbine-driven units were installed. An electric transmission line was constructed from the power plant to the Copper Range mines and we now obtain our electric power and lights from that source.

The preliminary, or reconnaissance work on this project was very interesting. To supplement the ground surveys, aerial pictures were taken from a plane flying at an elevation of 10,000 feet. This gave pictures that scaled about 1,000 feet per inch, from which maps of desired areas could be made. These aerial photographs were taken on five or six parallel lines along the Range, all the way from Lake Gogebic to Houghton. Some of our surface maps have since been checked and corrected from these pictures. Before the pictures were taken, the survey party looked for Section corners and, where found, these were marked with 8 x 8 foot squares of white cloth, but they did not show in the photographs as the plane flew too high for the camera to pick up such small marks. The best evidence of property lines was shown by cultivated or cut-over areas. In the cut-over and burned areas it was almost impossible to find Section corners. Loggers slashed off the timber without any attempt to save or perpetuate the corners. The local or state government authorities should have insisted on permanent markings for all such corners before any cutting was done.

23. GEOLOGY

The geological structure of the Range is a series of beds, or flows, of volcanic rocks known as traps and amygdaloids, with beds of conglomerates interspersed at varying intervals across the formation. Some of these conglomerates are quite uniform and constant in extent and serve as bases for locating other lodes. The direction, or strike, of these beds is NE and SW and they dip toward the NW at an angle of about 70 degrees with the horizontal. The whole formation is like a thick book with leaves of varying thicknesses held up on edge at an angle. The copper, mostly native metal, occurs in the amydaloids and sometimes in the conglomerates, but not in the traps which are, therefore, called the country rock.

In the early days of mining, little use was made of geology except to locate various lodes with respect to the nearest known conglomerate. (The Cousin Jacks called this Conglomeric.) Sometimes a geologist was called in to go over diamond drill cores or cross-cut explorations, but most of this work was done by the Company engineers. Then in the early thirties, when extensive explorations were being made toward the south and south-west, Mr. Paul Billingsley, a noted geologist, was employed to make a thorough geological study of all the Copper Range properties. Later, a regular geologist was added to the force and a very complete set of geological maps and records was developed.

Various methods of exploring were tried. Dip needle surveys were helpful in locating some of the beds, especially those containing iron minerals such as epidote. An electric method called Radiore was supposed to follow any lode or vein containing native copper. The trouble was that it would also pick up cross-seams containing iron compounds, so was not of much use. The diamond drill is, after all, the best method for exploring formations like these. The drill holes can be surveyed for dip and direction and the rock cores can be seen and studied. During the winter of 1916-17, when diamond drilling was going on out near 13 mile lake, the writer had many a cold ride in a sleigh behind the old horse when inspecting the work and collecting the core. There was also considerable snow-shoeing to do in making the rounds to some of the more distant holes. One day, on the way home from an extra long snow-shoe trip, I was pretty well tired out. The country was rough and was crossed by deep ravines and the new snow on top of an old crust was slippery. You had to help yourself up the hills by pulling on the trees and bushes. I was wearing one of those round Stetson hats that day and, just as I had reached the top of the last big ravine, a branch knocked the hat off. It lit on the brim and rolled all the way to the bottom of the ravine without striking a single tree or bush! I had to slide down after it and then climb the ravine all over again. The air in that vicinity was blue for some time!

At that time the big timber was still standing, and a trip through the forest, summer or winter, was delightful and awe-inspiring. One place west of Trimountain comes to mind. Here, in a sort of vale or low place, the trees were a mixture of hardwood and hemlock, with here and there a tall white pine. Sun-light, coming through the leaves above, cast flickering shadows on the ground and a slight breeze made a sort of music among the taller trees. And yet, over it all was a sort of hushed silence. It was like being in a vast, beautiful cathedral and inspired a feeling of reverence for the works of the Creator of all things.

24. METHODS OF MINING

The mines were opened and developed by means of shafts and drifts. The shafts were sunk about 1,000 feet apart along the strike of the lode and were 7 x 22 feet in size, with two skip compartments and a man-way or ladder road. They were sunk in or near the lode so that any copper taken out would help pay for the cost of sinking. The levels, or drifts, 10 feet x 8 feet, were started at intervals of 100 feet along the dip of the shafts. They followed along the lode and were usually connected through from one shaft to another.

The stopes, or working places, were started from these drifts, beginning 100 feet from the shaft so as to leave a shaft pillar to protect the shaft from caving. The stopes were carried up to within 15 feet of the level above, leaving a 15-foot floor-pillar. After the level above was worked out, these floor-pillars were recovered if conditions warranted.

At first all the rock was hoisted and sent to the stamp mill. In the upper levels, where the rock was fairly rich, this method was successful. Then, at depth, trouble began, due to heavy pressures and caving. Also, the values became poorer, so it was decided to pick or sort the rock, hoisting only that containing copper and leaving the waste-rock in the stopes for fill. This led to the dry-wall and mill system of mining which has been described on page 31.

In early days the only lights used underground were tallow candles hooked to a metal device on the front of the hat by means of an iron candle-stick. The pointed end of the candle-stick could be stuck into a timber or crevice in the rock. Some times a lump of clay was used to attach the candle to the hat. Some miners used a sort of wire cage over the hat and the clay ball was attached to this. The cage also provided some protection from falling pieces of rock. This was before the hard hat was introduced.

Then lamps burning a crude paraffine came into use. These were called Sunshine Lamps and the hunk of wax carried to replenish the lamp was known as Sunshine. These candles and lamps gave off a good deal of smoke which got into the nostrils and was a nuisance generally.

Later carbide lamps were introduced. Loose calcium carbide was placed in the bottom part of the lamp and water in the upper part. The water dripping down on the carbide formed acytelene gas which was led to a nozzle, or burner, around which was a reflector about 3 inches in diameter. An ordinary tobacco tin was used to carry an extra supply of carbide, and a small wire pick was used to clean the nozzle of the lamp when it became clogged. These lamps were vastly superior to the old candles and Sunshine Lamps and eliminated most of the smoke troubles.

Finally electric lamps came into use, fed by small batteries attached to a belt. The batteries were charged at the change-house between shifts. Electric lights were also placed at each level near the shafts and along the main haulage levels, making for greater safety. Current for these lights came from a generating plant on surface. The introduction of electricity also made possible the use of electric locomotives for hauling the rock, doing away with hand-tramming.

25. ACCIDENTS AND SAFETY

Up to about 1927 accidents in and around the mines were all too frequent. There were various causes, but most of them were due to falling rock, carelessly piled equipment, loose rocks or dirt on the floors of the levels and to the carelessness of the men themselves. A study was made of these things and a safety campaign started. A General Safety Committee was organized, under the chairmanship of the Superintendent, which held meetings once a month to discuss accidents and their prevention. A book of Safety Rules was compiled and printed and a copy was given to each employee. First-aid kits were placed at all working levels in the mine and also at the shops and hoist-houses. Rescue and First-Aid Crews were formed and trained by men from the U. S. Bureau of Mines. A Safety Engineer was appointed to watch things and see that these safety rules were obeyed. A violation of the rules meant the loss of one or more shifts, and continued violation meant dismissal from service. Since this campaign was started, accidents have been greatly reduced, as is shown by the following figures:

Year	Total number of accidents	Total shifts worked	Accidents per 1,000 shifts worked
1921	490	205,220	2.38
1927	339	152,100	2.22
1930	104	196,344	0.53
1935	40	142,519	0.28

Much credit is due Mr. Albert Mendelsohn, Superintendent at the time, for the organization and success of the safety program. Mr. Mendelsohn is now General Manager of the Greene-Cananea mine in Sonora, Mexico.

26. THE WHITE PINE

The White Pine property is situated in T.50 N., R.42 W., in Ontonagon County. The lode consists of a sandstone, or sandstone-conglomerate, between beds of shale, all containing copper and some silver. This is the same formation as the old Nonesuch mine about 4 miles farther west, which was one of the earliest mines in the Porcupine Mountain area. The copper occurs in very fine particles and flakes, making it difficult to save by concentration. The White Pine was worked for several years by another company, but was finally given up due, in part, to milling difficulties.

Recently the property was taken over by the Copper Range Company and other lands in the vicinity have been acquired, giving this company a large area on the lode, which is very flat.

An extensive diamond-drill exploration disclosed good values and a mill test of rock from the old mine with improved milling methods gave good results. So, in 1944-45, a new shaft was sunk on the lode and production is now getting under way. The rock is hauled in trucks to Ontonagon, from where it is shipped by rail to our mill at Freda. Later a railroad will probably be run to the mine over the old road-bed of the C.M.& St. Paul Ry., which was used by the old company.

Due to the extreme fineness of the copper, especially in the shale, extraction so far has been difficult, but better methods are being worked out and this mine gives good promise for the future.

27. FINAL CLOSING OF THE MINES

The closing of the mines which have so long been a mainstay of the Range is a great loss, not only because of the large investment in machinery and equipment, most of which must be scrapped, but because of the loss of employment to hundreds of men who, having spent most of their lives at mining, find it difficult or impossible to obtain other work, especially in a place where there is little or no other industry. It is indeed a sad and difficult thing to write about.

The closing of the Atlantic, Baltic and Trimountain mines has been already mentioned. From 1932 to 1945 the Champion was the only Copper Range mine operating. Then, in the fall of 1945, due to unfavorable market conditions and high labor costs, the Champion was shut down. Also, the mine was getting poorer at depth and much trouble was had due to heavy pressures and crushing of the rock, which made excessive timbering necessary.

At present some easily available rock is being hoisted from the upper levels near Nos. 3 and 4 shafts, but this is not expected to last long. The bottom levels are filling with water and removal of equipment is going on wherever it can be done profitably. When the mine water rises to a point just below the 3rd level, which may take from 3 to 5 years, it will be kept down to that point as long as the 3rd level domestic water pumps are in operation. Plans are now being considered for tapping the source of water from above by drilled wells, ultimately doing away with the 3rd level station and the necessity for maintaining the shaft.

At the Globe mine a concrete plug has been placed in the shaft just below the first level to prevent the water from the heavy overburden, some 250 gallons per minute, from going down and running over to the Champion, where it would have to be pumped.

The permanent closing of these mines is a great blow to the whole Range, as mining is about the only industry here. There are still possibilities at the Atlantic mine, and also at other places along the Range where diamond drill explorations have shown values and, if conditions ever warrant, some of these properties may be worked. Let us hope so.

28. FINAL WORD

Looking back over the past 50 years and thinking about the vast amount of work done at the mines and of the many changes that have taken place, the time seems very long. Yet the years have passed all too quickly. The writer is proud to have had a small part in this work and to have been associated with the grand people who were responsible for the development of the South Range.

One of the first engineering jobs at these properties was to lay out and direct the building of the pumping station down on the Pilgrim River, east of Trimountain, with its half-mile of pipe line to the location. The old station is now gone and the road partly grown over, but sometimes I visit the site and sit quietly, thinking of those days and of the fine men who worked there and helped in so many ways. The voices of those dear, departed friends seem to speak to me from among the whispering trees.

Among those who contributed decidedly to the company's engineering work were William McKenzie, William Barnicutt and Peter R. Steinen, all self-made men without college educations. Their cheerful, unselfish services, day or night, were outstanding and cannot be over-estimated.

"Billy" McKenzie, a Canadian, worked as a rod-man at the Trimountain back in 1903-04. In order to learn surveying he would go down to the office evenings, take the instruments and run surveys up and down the stairs and around the rooms all by himself. Then he would figure out the results and plot a map. All this after working 10 hours a day on the job.

Later on Mr. McKenzie went back to Canada and secured a job in the drafting department of the Canadian Pacific Railway. He was an officer in the Canadian army during the first world war and was wounded. After that he returned to the Canadian Pacific Railway. He is now retired and lives in Winnepeg.

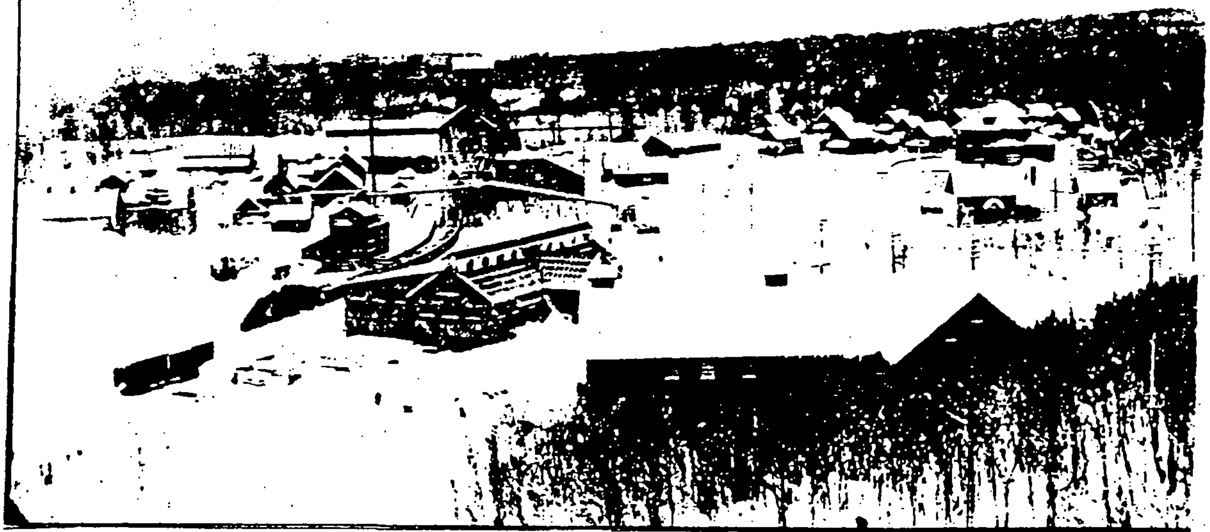
A story about him comes to mind. One day he was riding down the shaft on the skip when it crashed through two timber "gates" that had been carelessly left across the shaft by the dumpers. Luckily, Billy was not hurt and when asked later about how he felt said: "Well, when we went through the first gate, I was scared stiff. When we struck the second gate, I lost my dinner."

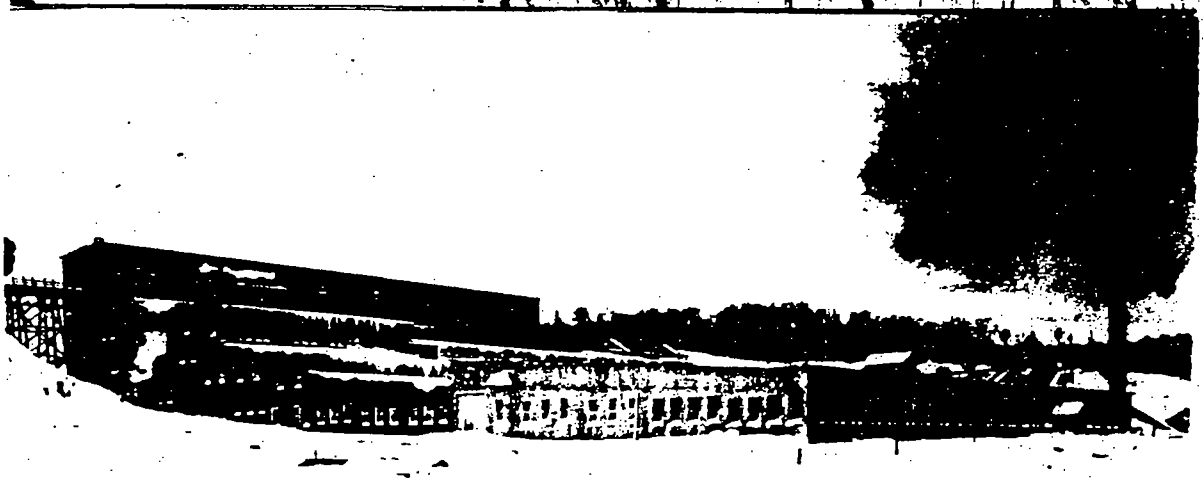
Bill Barnicutt was a rod-man at the Champion where his father was a miner. Bill also taught himself surveying and drafting and later became a draftsman for a motor company in Detroit, where he still resides.

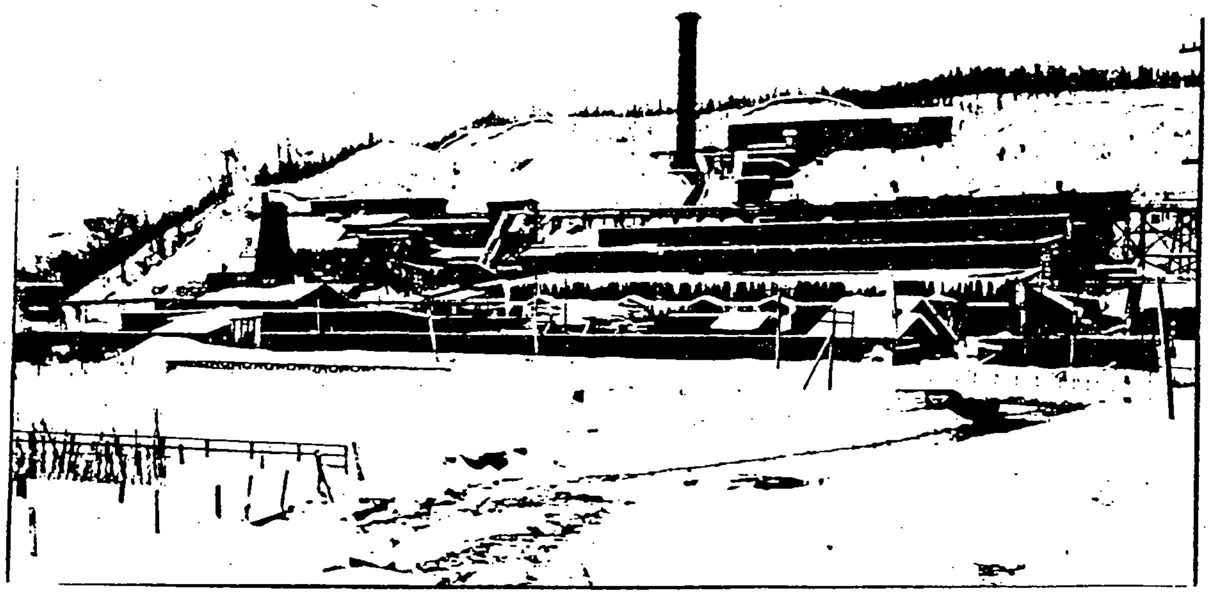
Peter R. Steinen, known to everyone as "Pete", started as a rod-man at Trimountain, later coming to Painesdale. Through diligent study and application he learned surveying and some construction engineering and for many years has been assistant mining engineer in charge of most of the underground surveying work for the company. His cheerful, efficient aid to the engineering department has been invaluable. He is still working here and at the White Pine and is one of the Copper Range Company's real "old-timers".

5

COPPER RANGE COMPANY, 1899-1982
by John Lasio, 1982







MINE - MILL - SMELTER

May 20, 1982

Mr. Burt Boyum
Assistant Manager of Administrative Affairs
Cleveland Cliffs Iron Company
Ishpeming, Michigan 49849

Dear Burt:

Subject: Copper Range

Strictly speaking, the material on Copper Range that you are receiving does not pretend to be a "rough draft". Rather it should be considered a descriptive catalog, or a resume of Copper Range activities over the years. The main events are written up in capsule form, each roughly complete in itself.

The end result is that there is no unified narrative (except in intent), and there is a good deal of deliberate repetition.

Now I would look for a critical review to determine if we have the basis for a Boom Copper chapter, followed by corrections, suggestions, and mutual agreement on what material would be included, or deleted, or researched in more detail. We would then be ready for a rough draft.

Offhand it would seem that Louis Koepel, Ray Franz and Bill Stewart would have first crack at the material. Bill Nicholls is back in town. He could be very helpful. These, of course, are only suggestions.

Looking forward to your comments.

Sincerely,

John E Lasio

John Lasio

cc: L. K.
R. J. F.
W. G. S.
D. J.

White Pine Copper Division, Copper Range Company

INTER OFFICE CORRESPONDENCE

TO Ray Franz AT Houghton

FROM Larry Chabot AT White Pine

SUBJECT CR Writeup DATE June 3, 1982

To Facilitate Correspondence And Filing Use Separate Sheet For Each Topic

I have read John Lasio's articles on Copper Range, which he intends to rewrite as an additional chapter in a reprinted "Boom Copper." The various short articles are quite interesting and represent a tremendous amount of research.

There are some brief points to be made about page 2 in the "Background" section:

1. Line 4: White Pine is not "of Ontonagon".
2. Line 6: The exhaustion of the Baltic Lode had no connection with our takeover by LL&E, and the two events were separated by many years.
3. Line 8: Copper Range did not disappear as an entity; in fact, it still exists as Copper Range Company and as a subsidiary of LL&E.
4. Line 9: WP is a division, not a company (here and in line 4 above).

On the final page of the booklet, it states that Copper Range's name is "assigned only to a residual sale division" when, in fact, it does exist as an entity - as part of LL&E's minerals division - with corporate offices in Lakewood, Colorado. The Hussey Division is still part of Copper Range, and we are also part owner and managing partner of Smoky Valley Mining Company in Nevada.

I also noted that Freda is not discussed. In addition, there are numerous instances where some tight editing of the text would be required, but I know the authors have this in mind.

Thank you for letting me see this. I'll keep this copy here unless you want it returned.

LEC:pjl

TABLE OF CONTENTS

INTRODUCTION

In the course of writing "Boom Copper", Angus Murdock has extracted the plums from the historical period involved and skillfully, sometimes flamboyantly, blended facts and fancy with the picturesque of boom and bust; and made of the melange an exciting story of the discovery and early exploitation of Michigan copper. His vignettes shine brightest as they illumen the era of 1848-1900 and the grim labor disputes of 1913. Michigan's second copper boom, fueled by the discovery of the Baltic Lode in 1897 and the speculative fever that marked the era, is touched upon only in passing.

This singularity is not Murdock's alone. Many have written about Michigan's Copper Country and its colorful past. But inevitably their imaginations are caught up with mines of Portage Lake; the Quincy, and Calumet and Hecla, and the early fissure mines of Keweenaw and Ontonagon. The so-called South Range, extending Southwest from Atlantic and dominated by the Copper Range Company with its rich Baltic Lode Mines, its extensive railroad interests, its smelter, and its quarter million acres of mineral and forest land has, so to speak, been relegated to a twilight zone overshadowed by the early giants of the district, and has never been granted its due in Copper Country lore by either the public or the popular historian. And yet in 1913, to choose a period, the three largest mining companies of the Copper Country, employing 4,107, 2,716, and 1,143 people respectively, were Calumet & Hecla, Copper Range, and Quincy.

BACKGROUND

The Copper Range Company was organized on January 20, 1899, as the result of an effort to expedite construction of a competitive railroad system through the 41 miles of undeveloped lands lying between Houghton and Mass City......and to develop the mineral land known to exist along the South Range, as this extension of the Keweenaw Copper Belt south of Houghton was called. The architects of this program were Charles A. Wright of the Mineral Range Railroad and his backers (local), who had first surveyed and acquired a right-of-way through the wilderness in the name of the Northern Railroad Company; and William A. Paine, a Boston capitalist, also President of Paine and Webber, an investment firm with offices in Houghton and Calumet, who arranged financing for the new railroad; and subsequently served as President of the Copper Range Company for it's first 30 years.

A key participant in the 1899 venture was the St. Mary's Mineral Land Company, which controlled large land holdings along the proposed railroad route - and which proposed to donate land (2,240 acres) in lieu of money; plus an offer to sell an additional 2,240 acres at an equitable price, providing that the railroad was completed by December 31, 1899.

In January of 1899, the Copper Range Company acquired the right-of-way of the Northern Michigan Railroad Company, as well as the lands of the South Range Mining Company owned by C. A. Wright - and additional land acquired from his backers - and the land contributed by St. Mary's Mineral Land Company. At its founding, the Copper Range Company consisted of 11,540 acres. At its peak it controlled timber holdings of 183,000 acres and mineral rights to 270,000 acres. Eventually, it also owned the Baltic, Trimountain, and Champion Mines on the Baltic Lode, the mills and a smelter, the Hussey copper and brass fabricating plants in Pittsburgh and the White Pine Copper Company of Ontonagon. It absorbed the St. Mary's Mineral Land Company and its remaining lands in 1931. Finally, with its Baltic Lode Mines exhausted, Copper Range itself was taken over by Louisiana Land and Exploration, an oil-gas company; and it disappeared as an entity. Its forest lands, * Hussey plant, and White Pine Copper Company continue to contribute to their new corporate guardian.

*Most of the forest lands, some 120,000 acres, were purchased by the Mead Corporation. About 50,000 acres remain in the hands of the Copper Range Division.

ST. MARY'S MINERAL LAND COMPANY

The St. Mary's Canal Mineral Land Company - originally known as The St. Mary's Falls Ship Canal Company - in 1852 constructed the first locks by-passing St. Mary's Falls at the Sault, thus eliminating a tedious portage and opening traffic to Lake Superior from the lower lakes. Upon completion of the canal the company received, in accordance with a previous agreement, 750,000 acres of land from the State of Michigan.

The lands were carefully selected by French and German geologists under the direction of Henry Quarre D. Aligny - the first of St. Mary's agents (General Manager). Included in the grant were pine lands in the upper portion of the lower Michigan peninsula, mineral lands in the Marquette Iron Range, and lands scattered along the Copper Range extending from Keweenaw Point to West of Lake Gogebic.

About 500,000 acres (of the original 750,000) were sold to the Iron Cliffs Company, now the Cleveland Cliffs Company and one of the nations most successful iron mining and processing companies. This parcel embraced all of St. Mary's lands on the Marquette iron range and all of their pine lands in Lower Michigan. Later St. Mary's was the parent company owning all, or a portion, of the lands that were sold to at least 49 copper mining companies. All but a few of these mines were located in Houghton County. The mines that purchased mineral lands to enlarge or to consolidate their holdings reads like a "blue book" of Copper Country mining...... Calumet & Hecla, Quincy, Copper Range, Atlantic, Baltic, Tamarack and Wolverine, to name some of the more successful. Hulbert, Calumet and Hecla's controversial discoverer, purchased his famous Section 23 from St. Mary's to acquire ownership of his original discovery site; and in the course of that purchase created the Hecla Mining Company. In later years, St. Mary's seldom sold its lands outright to new companies. It generally insisted on at least partial payment in stock. In 1899, one of the Copper Country's most prosperous years, it owned stock in the Baltic, Trimountain, and Champion Companies on the Baltic Lode, as well as in Pacific Copper, Winona Copper, Old Colony Copper, and the Mayflower Copper Company. Only the first three companies listed above became succesful ventures.

The Copper Range Company and St. Mary's Land Company shared mutual interest in many areas, as evidenced by their 50/50 ownership of the Champion Copper Company, and by their collaboration in the promotion of the Copper Range Railroad. The liaison of corporate officers was close and constant throughout the 1900's. In 1931 St. Mary's Mineral Land Company, in view of the depression and the uncertainty faced by the copper industry, voted to transfer all remaining surface rights and mineral rights to the Copper Range Company - a total of 84,622 acres in fee and 18,944 acres of mineral rights.

St. Mary's own efforts to develop a mine was never successful.

BALTIC LODE DISCOVERY

In 1883, when Captain John Ryan (father of Anaconda's Chairman of the Board) began his Six Mile Hill exploration - so-called because of its proximity to Houghton and an old Ontonagon Road landmark, he was nevertheless prospecting in rugged, thickly forested "bush" country. His activities (the first recorded work on the Baltic Lode) disclosed strong mineralization, but his drill holes and shallow shafts went down at about 55° - the prevailing dip of the mines south of Portage Lake - and quickly ran out of ore. He abandoned his exploration project, discouraged because of the apparent erratic mineralization. In 1897, 14 years later, Captain Dunn of Houghton optioned the lands from St. Mary's Mineral Land Company (the owner) and determined that the true dip was 73° not 55°, and that the lode carried sufficient copper to warrant the formation of the Baltic Copper Company, which took over the project in December, 1897.

Captain Dunn's Six Mile Exploration was acquired by the same hard-driving capitalists and mine developers, who controlled the nearby Atlantic, and the Wolverine and Mohawk mines north of Calumet. Skilled in every phase of mine financing, development, and operation, this group headed by Dr. Fay and John Stanton, extended the Atlantic Mine's private railroad to the Baltic Mine site; and by utilizing the skills and resources of its other mines, guided the Baltic Mine into full production within 4 years -- in time to share the boom copper prices of 1899-1900 and 1901.

During this period they equipped 4 mine shafts, built a mill on Lake Superior and collaborated with the Atlantic in constructing the world's largest all steel dam to impound water for the two mills. The dam differed from conventional concrete design in not being keyed to rock walls - but relied on the weight and design of the steel structure to hold back the large reservoir of water from the Salmon River drainage shed.

The Marquette Journal of 1899 called the Baltic Lode the "only new copper lode discovered in 30 years". This it was. It was also the last major native-copper deposit to be discovered and successfully exploited in the Keweenaw Peninsula. Its out-pouring of red metal and stockholder dividends was only surpassed by the Calumet Conglomerate and the Kearsarge Lode.

THE RAILROAD

Quincy, Calumet and Hecla, and most of the other active mines in the decade after the Civil War were located north of Portage Lake. In 1873, the Mineral Range Railroad was built from Hancock northward to Calumet and vicinity serving these mines and communities and connecting with the Mineral Range dock and warehouse facilities on the Hancock shore of Portage Lake. During the shipping season hordes of small freighters crowded the docks in the course of delivering and picking up freight. The shipping season was short, however, and ended abruptly with the coming of winter....and a frozen Lake Superior.

The Copper Country continued to lack direct rail connections to the outside world until 1883 when the Duluth, South Shore and Atlantic Railroad finally extended a branch line from L'Anse to Houghton. The DSS&A provided access to Sault Ste. Marie, its eastern terminus, and connections with other railroads running to Detroit, Chicago, and the twin cities of Minneapolis-St. Paul. Two years later (1885) a private drawbridge spanning Portage Lake made it possible to extend the new railroad to Hancock and Calumet. The Copper Country was no longer isolated!

Hancock and Houghton were at that time the hub of a mining metropol that extended for twenty miles along the copper belt --- from Atlantic Mine on the South to Calumet on the North. There were no railroads breaching the forests of white pines and hardwoods and scattered hamlets of the South Range (as the Copper Belt Southwest of Houghton was called) between Houghton and Mass City -- only the Old Ontonagon Road winding its lonely way through the primeval forests.

As the only outside Railroad serving the Copper Country, the DSS&A could and did charge top dollar for its services. This incensed Charles A. Wright, the youthful Secretary-Treasurer of the Mineral Range Railroad. He recognized that only another competitive railroad could force down freight rates, so in 1884 Wright proposed to William A. Paine, a Boston capitalist and head of Paine-Webber, a stock brokerage firm with offices in Houghton and Calumet, and R. R. Godell, General Manager of the St. Mary's Mineral Lands Company (by far the largest owner of mineral lands along the South Range) that a railroad be built from Houghton south and west along the Copper Belt to connect with either the Chicago, Milwaukee and St. Paul at Mass City (41 miles), or 60 miles to Bruces Crossing and the Chicago and Northwestern Railroad. Both Paine and Goodell looked favorably upon the idea. The potential for developing mineral lands was obvious but both agreed that the timing was not right for such a venture.

Charles Wright bided his time but never relinquished his plan for a new railroad to the Southwest. The Secretan copper "corner" of 1885-1887 depressed copper markets after its collapse, but nevertheless, in 1889, Wright with 10 stock holders organized the Northern Michigan Railroad Company. A route survey between Houghton and Mass City was completed by 1889 but the project drained the Treasury of the fledging company. Wright, by now General Manager of the Mineral Range Railroad, now approached both the Chicago, Milwaukee and the Chicago and Northwestern Railroads with his idea. Both expressed interest but delayed final approval, first because of the Panic of 1893, and then because of the Free Silver agitation of 1897. Wright impatiently dropped the Railroads as potential backers in 1898 and went back to Goodell and A. G. Stanwood, General Manager and Secretary-Treasurer, respectively, of the St. Mary's Mineral Land Company regarding building the railroad to Mass City.... some 41 miles Southwest of Houghton. The two were very receptive to the idea (by this time (1897) the Baltic Lode had been discovered on St. Mary's lands. Its richness was common knowledge). St. Mary's promised no funding, but did agree to donate 2,240 acres of land along the railroad right-of-way, with options to purchase another 2,240 acres at an "equitable price" upon completion of the railroad. W. A. Paine now agreed to contribute substantially and induced others to do the same. Fate again intervened in the form of the Spanish American War in 1898, and funding was held back.

The Spanish American War ended in late 1898. St. Mary's, with a potentially large stake in Baltic Lode land, now set a deadline for completion of the proposed railroad by 12/31/99 or forfeiture of its land donation. Survey crews sent out in mid-winter (1898) to locate a right-of-way started from both ends of the proposed railroad - every man on snowshoes, living in tents, sleeping on beds of fir and balsam, enduring the storms and bitter cold, slashing their survey lines through dense forests and across the rivers and rolling hills. The task was completed and early in 1899 railroad construction was started.

William A. Paine and Charles Wright now agreed, in view of the Baltic Lode discovery and the flurry of promotional activity then stirring the Copper Country, to broaden the scope of the project to encompass both mine development and railroad construction. Accordingly, a new company called the Copper Range Company was chartered on January 20, 1899.

The new company absorbed Wright's Northern Michigan Railroad Company and acquired legal title to its right-of-way. It also took over all land rights involved. This included the St. Mary's donations, plus 3,360 acres of the Wright owned South Shore Mining Company, and an additional 3,700 acres administered by Wright for the Smith-Douglas estates, for a total of 11,540 acres strategically located within 10 miles of Houghton.... and so the Copper Range Company was launched. At its peak Copper Range eventually owned or controlled 273,000 acres of mineral rights and timberland.

The railroad was capitalized at 100,000 shares of $25 par value stock, issued to the partners in the venture on the basis of their contributions. With the vigorous promotion of Paine and Webber to speed the stock on its way it quickly rose to $59 a share. Charles Wright served as General Manager of the railroad during its construction stage. Paine, as a majority stockholder, was elected President of Copper Range, a position he held until his death on September 24, 1929.

Winter storms, summer rains of unusual intensity, and labor and material shortages had failed to daunt the determined railroad builders. Passenger trains were already running over unballasted track from the mining town of Winona by mid-December of 1899. The railroad was officially declared operational on December 23, 1899, when the final spike was driven at its junction with the Chicago-Milwaukee and St. Paul Railroad siding near Mass City. The railroad had met is commitment to St. Mary's Mineral Land Company and accordingly received the 2,240 acres of land agreed upon as a reward for scheduled completion of the project. Charles Wright was 29 when he first broached the idea of a railroad. He was 45 when the project was completed.

Two 85' high wooden bridges and three steel bridges 65' to 85' high were built in the course of crossing valleys and stream-beds.

Charles Wright relinquished his ties (but not his stock) with Copper Range after three years. His entrepreneurial skills were then devoted to banking and the development of the Keweenaw Central Railroad that ran from Calumet northeast along the mineralized spine of the Keweenaw Peninsula, but the Keweenaw Central potential never developed. The railroad was as great a failure as the Copper Range was a success. The Keweenaw Central exists today in name only - its railroad bed now maintained by the State for snowmobile enthusiasts.

The Copper Range went on to serve its Baltic Lode mines, their mills and smelter (all merged into Copper Range), numerous embryo mines that sprang up along its route (Challenge, Elm River, Wyandotte, Penn, Belt, Mass, Victoria, Winona, Adventure, etc.) and numberless lumber sidings.

It made life bearable for the isolated mining towns and their people. Over the years it transported thousands of high school students from the Copper Range mill towns on the shores of Lake Superior and from the villages of Baltic, Atlantic and South Range, to a central High School located in Painesdale - the only railroad in the country used for this purpose.

As the forests dwindled and mines closed, the Copper Range Railroad finally began a slow decline. Long a prosperous and integral factor in the district, it finally stopped operations on October 31, 1972; abandoned its lines on March 31, 1973; and dissolved its corporate status on December 28, 1979, almost 70 years after its inception. Today, it too is fast becoming a memory -- its road-beds in large part designated as the "Bill Nicholls Snowmobile Trails".

RETROSPECT

In 1897 as the Baltic Lode (so called to complement the nearby Atlantic and Pacific properties) first emerged as a potential copper producer, only six mines.......Quincy, Calumet and Hecla, Tamarack, Osceola, Kearsarge, and Atlantic, all located along a twenty mile stretch of the Copper Belt, and all except the Atlantic north of Houghton, were paying dividends. The copper market was just emerging from a decade that had seen copper prices sag to 9¢ per pound - a low not to be repeated until the depths of the 1930 dpression years......but the mood of the country was now upbeat and 1897 saw not only the Baltic mine but the Arcadian mines underwritten by Standard Oil interests, and the new Osceola-lode shafts of Calumet and Hecla starting production.

In 1898, following termination of the Spanish American War, as Wm. A. Paine and Charles A. Wright were finalizing their plans for construction of a railroad southwest of Houghton, Quincy, after 32 years of mining on the Pewabic Lode, was just blowing in its new smelter located on the old Pewabic stamp sands near the present Portage Lake bridge.

It was 1899 that stands out as a year of unparalleled prosperity in the Copper Country. Michigan's re-awakened Copper boom drove stock speculations, mining promotions, and copper mining activities to frenzied levels. This was the year that saw Calumet and Hecla pour out $10,000,000 in dividends. Quincy, alone, paid out an additional $950,000.

Caught up in the excitement, Wm. Paine and Charles Wright agreed in January, 1899 to incorporate the Copper Range Company; not only to construct a railroad southwest from Houghton to Mass City, but to seek out mining properties for development. The discovery of the Baltic Lode, adjacent to the route of the proposed railroad, acted to reinforce this decision.

THE CHAMPION DISCOVERY

While Charles Wright devoted his energies to railroad construction, Wm. Paine wasted no time. Dr. Lucius L. Hubbard, Michigan's State Geologist, was hired to direct exploration on Copper Range lands. By June, 1899, Dr. Hubbard (and some say Michael Messner, Sr., a veteran logger and early settler in the area) had discovered copper in the bed of a small stream coursing the property near the site of the present Painesdale depot. Subsequent trenching confirmed the existence of a wide lode, richly mineralized. The South extension of the Baltic Lode had been discovered - and the site of the appropriately named "Champion Mine" established.

Word of the "Champion" discovery spread quickly - but the public was puzzled that no immediate attempt was made to incorporate, or to speed, such a potentially valuable property into production. The truth was that while Dr. Hubbard had discovered a mine of fabulous potential, he also discovered that Copper Range did not possess all of the outcrop - an essential for orderly mine development. St. Mary's Mineral Lands, a long time participant in the new railroad venture, owned the land carrying the Baltic Lode out-crop. As the price for obtaining the outcrop, Copper Range was forced to cede a 50% interest in the Champion to St. Mary's, plus $120,000 for 240 acres of land. Champion was incorporated in December, 1899. The railroad to Mass City was declared complete soon after. In the meantime, the Trimountain Mining Company, which owned the intervening stretch of property between the Baltic and Champion Mines, had not been idle. Its first shaft near its south property line was lined up with Hubbard's exploratory work on Champion lands, and by June, 1899 had reached the lode. The rest of its property was overlain by quicksand and deep overburden. Its second shaft required a 105' drop shaft through the quicksand to reach ledge - then a 176' of cross-cut to reach the lode. It was, however, successful in its efforts - and the Baltic Lode wherever exposed at Baltic, Trimountain, or Champion, proved to be wide and well mineralized.

All three mines were located in dense forest land, and rugged, hilly country. First access to the mine sites was by foot - followed by rough roads and teams. A sawmill was almost a prerequisite as land was cleared for mine buildings and for town construction. The Baltic and Trimountain Mines named their towns after the mine. The Champion named its satellite town Painesdale in honor of Wm. A. Paine, President of Copper Range. Each mine put down four shafts spaced about 1,000' apart. In earlier years, this spacing would have been much closer. All three mines started production by milling their rock in either the Atlantic, or Arcadian mills, pending completion of their own facilities. By 1903, all of the mines had their own mills. The speed with which these mines were discovered, financed, developed, built and placed into production, is tribute to the many advantages then available but lacking in the earlier days of mining.......an ample supply of skilled labor and supervision, adequate financial backing, a ready availability of material and machinery, a better grasp of the geology of the district and of the amygdaloids in particular, a standardized approach to mining and milling practice and, after 1899, a railroad to service the mines.

COPPER RANGE CONSOLIDATED

Even before the Champion Mine could reach a productive stage, Wm. A. Paine was astutely looking far beyond the Champion property lines. In 1901, he and his associates (including John Stanton) chartered the Copper Range Consolidated Copper Company as a holding company, under the more liberal laws of New Jersey. The company was capitalized at $28,500,000 with 285,000 shares outstanding. Paine and Stanton held one half of the stock of the new company.

The new company first absorbed all of the Copper Range assets... the Champion mine, the railroad, and all land holdings, into its corporate shell. Next, in 1902, the Baltic mine was acquired by stock exchange and consolidation. By 1903, on its second attempt, it managed to acquire the Trimountain. The Goliath that would dominate the South Range had been created. As President of the Copper Range Consolidated, Wm. A. Paine now controlled almost 4 miles of Baltic Lode, its 3 mines and 12 shafts, its 3 mills, all of the associated townsites, the Copper Range Railroad, and by 1904, a 60% interest in the new Michigan Smelter built in partnership with the Stanton interests.

The South Range now surged with people and activity as Copper Range raced to bring its mines into peak production; to expand its town sites to accommodate mine and mill workers; to extend its railroad an additional 20 miles to Calumet; to build a library in Painesdale; and a hospital in Trimountain.

Calumet and Hecla never relinquished its dominant position as the "Colossus of the North". Quincy, the Copper Country's "Old Faithful", although 46 years old in 1902, continued to pour out its red metal with undiminished vigor. The Goliath of the South Range now joined this select group. The power elite of the Copper Country.....Agazziz and the Shaws, Bigelow, Stanton, Fay, Mason and Todd, opened ranks briefly as Paine and his associates joined them as arbiters of Copper Country destiny.

MINES AND MINING

The fact that the Calumet Conglomerate Copper confined itself within the North and South property lines of Calumet and Hecla - selected with uncanny accuracy by Ed Hulbert, its discoverer, was a source of envy and financial woe to many who could not accept the reality that there was only one Calumet and Hecla, but history did repeat itself. This Copper Range proved by acquiring as one continuous 4 mile stretch the best of the Baltic Lode. The Atlantic Mine, closed by a collapse of its underground workings in 1906, spent thousands of dollars seeking the North extension of the Baltic on its property but encountered only faulted, barren rock. The Isle Royale Mine exploration met a similar fate. A fragment of Baltic Lode was discovered by the Superior and the Houghton Copper Companies but these efforts survived on a small scale for only a few years. Copper Range, itself, tried twice to extend the rich Champion beyond its Southern boundary. On its second attempt, after sinking a drop shaft through 245' of treacherous quicksand, it finally locked into the Baltic Lode extension - only to find it erratically mineralized and badly broken.

. . . .

The Champion and the Baltic Mines became the breadwinners of the Copper Range empire. Trimountain, except for a short period during its early years, never lived up to its promise. The Baltic Mine was a fine property but was over-shadowed by the superlative Champion. World War I challenged the production capability of the Michigan Copper Mines. Although handicapped by labor and material shortages, all mines managed substantial increases in production. No amygdaloid mine ever matched the flood of red metal that poured from the Champion workings in 1915 and 1916......33,407,000 pounds and 33,601,000 pounds, respectively, nor exceeded the dividend payments of $3,000,000, $6,000,000 and $4,480,000 in 1915, 1916, and 1917.

If one were to compare the entire Baltic Lode output for that period against that of an aging, but still vigorous Calumet Conglomerate, we would find that the Copper Range output of 53,739,000 pounds and 54,747,000 pounds surpassed Calumet Conglomerate production during 1915 and 1916, and almost equaled it in 1917. In normal times, only the Quincy (even after 60 years of mining) and the Ahmeek amygdaloid mines could challenge but hardly excel Champion production. The "Champion" did indeed live up to its name and the glowing predictions made following its discovery by Dr. Hubbard.

MINING METHOD IMPROVEMENTS

The loss of the still profitable Atlantic Mine in 1906, as a result of caving, sobered the mine operators of the day. This was the year when the members of the Lake Superior Mining Institute meeting in Houghton first discussed openly the "rock bursts" or "man-made earthquakes" that were occurring with increasing frequency in the deeper mines of the district. Changes in mining practice began to take place. Pillar size and placement began to receive more attention. Retreat mining.....mining from property limits back to the shafts.... became an accepted practice. The Copper Range mines, because of the steep dip of the lode (70-73), developed their own unique mining and mine support methods. These were based upon the use of thick rock walls and ore chutes built by their immigrant masons in conjunction with the selective sorting of ore in the stopes. As a result of the discard, 40-60% of the broken rock remained in the stopes to support the mine walls. The grade of ore shipped to the mill almost doubled and actual copper production increased. Mining and transportation costs decreased and underground safety was improved. Over the years, as mining depths increased, the Copper Range modified its methods to improve ore selectivity and ground support even more, eventually eliminating even the unique walls and chutes for which it was noted. The other mines of the district made relatively fewer changes in mining practice due to the limitations imposed by their flatter dips.

THE COPPER COUNTRY STRIKE

The Copper Range mines did not escape the county wide strike called by the Western Federation of Miners on June 23, 1913. The strike lacked the full support of the mine employees; but this was offset by the militancy of the strikers and their leaders. The issues were not so clear-cut as in the Western strikes because, by and large, company paternalism was effective and well accepted. The issue of work hours, the one man machine, grievance procedures and wage levels were effectively raised by the strikers. The mining companies of the district flatly refused to bargain with the Federation and strike collapsed during March, 1914; not, however, without severe violence and some deaths having taken place.

The strike left a lingering bitterness and a significant morale problem that was never completely erased. The problem was, perhaps, not as pronounced as at Calumet where the Calumet and Hecla mines were the chief target of the Federation. An immediate result, the beginning of a long-time trend, was the exodus of workers. Copper Range started the strike with 2,716 employees. It ended with 2,379. The outflow continued over succeeding years - aggravated by the demands of World War I, the rise of defense industries and the auto industry in the cities, and because of the uncertainties of the copper industry after World War I. Recruitment and even importation of foreign labor did little to help. In 1923 the Copper Range annual report, one of several belaboring the theme of labor shortages, spoke of a mine at full strength at the start of the year and a 50% loss of workers by September of that same year. Under the circumstances, production and mine development activities were severely handicapped. This problem was not unique to Copper Range. It was a pattern throughout the Michigan Copper district.

TROUBLED TIMES

The insatiable demand for copper and the accompanying high metal prices, 37¢/lb. in 1916, resulted in several years of never to be surpassed, or relived, prosperity for the Michigan Copper mines. The euphoria disappeared as the war ended and copper prices and demand tumbled but wages and supply costs remained high. To Copper Range, this meant that 1919 marked a high tide for earnings that would never again approach wartime peaks.

During the 1920's as copper prices trended lower and lower, many copper companies closed their mines or operated at reduced levels. The Copper Range mines took the latter course. The workers, fearful for job security and well aware that the mines had passed their prime, responded by increasing their exodus from the district. The appearance of imported lower priced copper from South America and Africa further compounded the problems of Michigan copper industry.

In early 1924 the Champion mines faced up to emergency problems of another nature. The south end of the mine was overlaid by nearly 250 feet of water bearing sand. Early in 1924, this water broke through the outcrop and into the Upper levels of the mine. Flowing at measured rates of 2,750 g.p.m., the deluge threatened to flood the mine. By year-end, however, after almost super-human efforts, the inflow was brought under control and the water diverted to newly installed pumps. The only adverse effects were a partial loss of production and flooding of the lower levels of the Trimountain mine. The water proved to be of potable quality. Copper Range - turning adversity to advantage - and loss to profit - set up long-term contracts with Houghton and Hancock and nearby South Range villages for sale of the water. The old mine workings of the Champion are still maintained to protect the source and distribution of this water supply.

TWILIGHT YEARS

The late twenties and early thirties were significant years in Copper Range history. Wm. A. Paine, founder, and President of the Copper Range empire for 30 years, died in 1929. He was succeeded by his son Ward Paine. Shortly thereafter in 1930 and 1931, it became necessary to close the Trimountain and the historic Baltic mines, both of which had been losing money during the twenties. Most of the workers were transferred to the Champion to replenish a decimated labor force.

Today the second growth forests have taken over the mine sites of those grand old mines and it is becoming difficult to locate sites of the long line of shaft houses that once crowded the skyline.

It was in 1929, year of Wm. Paine's death, that Copper Range purchased the White Pine Copper Company at a tax sale where Calumet and Hecla, former operator of the mine, was the only bidder. The story of the purchase has many of the aspects of a cloak and dagger mystery and warrants a chapter of its own. It required 23 years of intensive and costly work to develop a process to handle the White Pine sulfide ores but "success crowned patient effort", and White Pine today is Michigan's only copper producer and one of the nation's largest copper mines.

Copper Range managed to maintain a strong financial position throughout the twenties and the post World War I years. In 1928 it acquired an option in the Victoria hydro-electric development, an option exercised jointly in 1929 with the Middle West Utilities Company. The property acquired involved lands along the Ontonagon River for the development of seven hydro-electric plants with a total estimated output of 175,000,000 KW hours per year. The Victoria plant which was started in October 1929 and completed in 1930 was designed to develop 45,000,000 KW hours per year.

At the time this investment was made, one factor was not overlooked - the eventual needs of a White Pine copper mine. By January 2, 1931, the Copper District Power Company was serving the Copper Range mines, the Villages of Rockland and Ontonagon, and the Houghton County Electric Light Company.

The venture proved profitable and power demand escalated. Part of the profits were rolled back into construction of the Bond Falls reservoir built in 1939 to assure the Victoria plant a stable source of water.

In 1947, the Copper District Power Company exchanged its assets for those of the newly organized Upper Peninsula Power Company. The exchange was profitable to Copper Range but by March 8, 1950 it sold its remaining stock in Upper Peninsula Power Company and withdraw from the power generation field.

In 1931, Copper Range was invited by bankers to take over the assets and debts of the ailing Hussey Fabricating Plant founded by Dr. Hussey of Cliff Mine fame. The Hussey Plant processed a sizable portion of Copper Range copper for its mills. The offer was accepted and by 1936

CURTAIN

Copper Range operated its mines, sometimes at reduced levels throughout the depression years, even though other mines, including those of Calumet and Hecla closed temporarily. World War II, with its government controlled metal prices, and the beginning of Union restrictions, weakened the old Champion. Starting in 1937 and continuing until 1964, the Copper Range remilled its old Baltic Lode stamp sands. In 1963-1967, it cleaned up the old Atlantic sands (the Atlantic Mine had been acquired in 1910). In 1945 the Champion finally stopped all mining on the Baltic Lode and removed the pumps on its lower levels. A chapter in Copper Country and corporate history had come to a close. Mining operations continued for a few years longer in the East Conglomerate lode but the economies of the operation were never favorable. On September 23, 1967, the Champion closed forever - 62 years after its discovery.

Today "E" shafthouse still remains as a monument to a once great mining empire. The shaft is used for access to the pumps that transfer drinking water to surrounding communities from its upper levels. This is the oldest original Shafthouse extant in the Copper Country. Quincy No. 2, a familiar landmark on the Hancock side of Portage Lake, is the next oldest. Three other recent shafthouses of 1969 vintage are owned by Universal Oil Products on former Calumet and Hecla lands. These are all that remain out of hundreds that once dotted the landscape of the Michigan Copper Country.

Copper Range was in position to purchase the remaining stock of the Hussey firm and to consolidate it into Copper Range. The plant grew in response to new leadership established by Copper Range and during the thirties and forties its earnings made possible resumption of dividend payments by Copper Range and financed capital for the development of White Pine. In time, after expansion, its copper needs exceeded the capacity of Copper Range's old mines. The Hussey plant continues as an integral part of the Copper Range assets acquired by Louisiana Land in 1977.

It was also in 1931 that St. Mary's Mineral Land Company, long a factor in the Copper Country, agreed to consolidate its remaining assets with Copper Range. The 50% interest it held in the Champion Mine finally reverted back to Copper Range after 32 years, plus 84,622 acres of fee lands and 18,944 acres of mineral rights. The Copper Range at this time held the assets of 21 extinct mining companies acquired because of land, timber or residual mineral values.

In 1969, Copper Range erected its Northern Hardwoods plant located near the Village of South Range to manufacture lumber and dimension stock for the furniture industry - thus utilizing its large timber holdings to a better advantage. The Copper Range Railroad, the original source of the Copper Range empire, ceased operations in 1973.

In 1977, Louisiana Land acquired Copper Range and all its assets by consolidation. This now includes only White Pine and some mineral and forest lands. Northern Hardwoods and the bulk of the timber holdings were sold to Mead Corporation by Louisiana Land in June, 1982. Today, the Copper Range name is assigned only to a residual sale division with 50,000 acres remaining. Copper Range, the Goliath created by William A. Paine is disappearing into the mist of time.

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AGREEMENT OF MERGER

THIS AGREEMENT dated this 24th day of November, [illegible], made by and between COPPER RANGE COMPANY, party of the first part, a corporation organized and existing under and by virtue of the laws of the State of Michigan, and C. G. HUSSEY [illegible] [illegible] virtue of the laws of the Commonwealth of Pennsylvania.

W I T N E S S E T H That:

WHEREAS, the corporations parties to this agreement deem it advisable to merge C. G. Hussey & Company, the party of the second part, into Copper Range Company, the party of the first part, under and pursuant to the terms and conditions hereinafter set forth; and

WHEREAS, Copper Range Company, party of the first part, has now outstanding 550,000 shares of common capital stock without par value (of which 5,578 shares are held in the treasury), and C. G. Hussey & Company, party of the second part, has now outstanding 65,000 shares of common capital stock without par value (of which 59,000 shares are owned by Copper Range Company);

NOW, THEREFORE, the corporations parties to this agreement by and between their respective boards of directors have agreed, and do hereby agree, each with the other, to merge C. G. Hussey & Company, the party of the second part, into Copper Range Company, the party of the first part, pursuant to the laws of the State of Michigan and of the Commonwealth of Pennsylvania, and do hereby agree upon and prescribe the terms and conditions of said merger and of carrying the same into effect, as follows:

ARTICLE I

C. G. Hussey & Company shall be and hereby is merged with and into Copper Range Company, a corporation of the State of Michigan,

CC.

which shall be referred to hereinafter as the "surviving corporation". The corporate name, identity, existence, franchises, rights and immunities of the surviving corporation shall continue unaffected and unimpaired, and, upon this merger becoming effective, the separate corporate existence of C. G. Hussey & Company shall cease except in so far as the same is continued by statute, and, subject to com- [illegible] the [illegible]ealth [illegible], its property, franchises, rights and immunities shall be possessed by and vested in the surviving corporation as specifically set forth in Article X hereof.

ARTICLE II

The name of the surviving corporation is Copper Range Company.

ARTICLE III

The purpose or purposes of the surviving corporation are as follows: To engage in and carry on the business of mining, refining, smelting and manufacturing any and all kinds of ores, minerals and metals and of manufacturing, producing and selling materials and articles of commerce composed in whole or in part of copper, brass, iron, steel or any other metal, and to do any and all acts and things and transact any and all other business incidental to the purposes aforesaid and with all the powers conferred upon corporations by the laws of the State of Michigan.

ARTICLE IV

The location of the surviving corporation within the State of Michigan is at Houghton and Painesdale in the County of Houghton and State of Michigan. The postoffice address of the registered office of the surviving corporation in Michigan is Painesdale.

ARTICLE V

The authorized capital stock of the surviving corporation is 565,000 shares of common capital stock without par value and having a book value as of November 1, 1936, after giving effect to this merger, of $18.52 per share.

ARTICLE VI

The manner of converting the shares of C. G. Hussey & Company into shares of Copper Range Company, the surviving corporation, shall be as follows: Of the 65,000 shares of C. G. Hussey & Company now outstanding, 59,000 shares, being the shares owned by Copper Range Company, the surviving corporation, shall, upon this merger becoming effective, be surrendered to C. G. Hussey & Company for cancellation and the balance, consisting of [illegible],000 shares, constituting all shares other than those owned by Copper Range Company, shall be converted into shares of common capital stock without par value of Copper Range Company on the basis of 2½ shares of Copper Range Company for each share of C. G. Hussey & Company, and shall, upon this merger becoming effective, be surrendered to C. G. Hussey & Company for cancellation. The 15,000 additional shares of Copper Range Company to be issued upon such conversion shall be capitalized at $15 per share, the amount so capitalized being at least equal to 50% of the consideration received for said additional shares, and said additional shares shall be on a parity in all respects with the 550,000 shares of common capital stock without par value (of which 5,578 shares are held in the treasury) of Copper Range Company outstanding prior to this merger.

ARTICLE VII

The first board of directors of the surviving corporation shall consist of the twelve individuals who are now directors of the surviving corporation, Copper Range Company, and their names and addresses are as follows:

Name	Address
P. F. Beaudin	89 Broad Street, Boston, Mass.
Edward Cunningham	Sears Building, Boston, Mass.
W. Cameron Forbes	Sears Building, Boston, Mass.
Robert H. Gross	85 Devonshire Street, Boston, Mass.
Albert Mendelsohn	Painesdale, Michigan
F. Ward Paine	89 Broad Street, Boston, Mass.
Stephen Paine	82 Devonshire Street, Boston, Mass.
W. H. Schacht	Painesdale, Michigan
John E. Thayer	30 State Street, Boston, Mass.
John M. Wagner	Houghton, Michigan
Sydney M. Williams	Pond Road, Wellesley, Mass.
J. A. Ackroyd	89 Broad Street, Boston, Mass.

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Said persons shall be and continue to be the directors from and after the date of merger until the first annual meeting of the stockholders of the surviving corporation and until their successors respectively are elected in accordance with the by-laws of the surviving corporation.

ARTICLE VIII

The term of existence of the surviving corporation is fixed at thirty years from the 20th day of January, 1929.

ARTICLE IX

The by-laws of Copper Range Company shall remain and be the by-laws of the surviving corporation until the same shall be altered or amended according to the provisions thereof. The first annual meeting of the stockholders of the surviving corporation shall be the annual meeting provided by the by-laws of said corporation for the year 1937. All persons who at the time of the merger shall be executive or administrative officers of Copper Range Company shall be and remain like officers of the surviving corporation until the board of directors of such corporation shall otherwise determine. The first regular meeting of the board of directors of the surviving corporation shall be held as soon as practicable after the consummation of the merger and may be called in the manner provided by its by-laws for the calling of special meetings of the board and may be held at the time and place specified in the notice of the meeting.

ARTICLE X

The surviving corporation shall possess all the rights, privileges, powers and franchises, as well of a public as of a private nature, and be subject to all the restrictions, disabilities and duties of each of the corporations parties to this agreement, and all and singular the rights, privileges, powers and franchises of each of said corporations, and all property, real, personal and mixed, and all debts due each of said corporations on whatever account, as well for stock subscriptions as all other things, in action or belonging to each of said corporations, shall be vested in the surviving corporation; and all property, rights, privileges, powers and franchises, and all and every other interest shall be thereafter as effectually the property of the surviving corporation as they were of the respective corporations parties to this agreement, and the title to any real estate, whether by deed or otherwise under the laws of the State of Michigan vested in each of such corporations, shall not revert or be in any way impaired by reason of this merger, provided that all rights of creditors and all liens upon the property of each of said corporations parties to this agreement shall be preserved unimpaired, and all debts, liabilities and duties of the respective corporations parties to this agreement shall thenceforth attach to the surviving corporation and may be enforced against it to the same extent as if said debts, liabilities and duties had been incurred or contracted by it. The aggregate amount of the net assets of each of the corporations parties to this agreement which was available for the payment of dividends immediately prior to this merger, to the extent that the value thereof is not transferred to stated capital by the issuance of shares or otherwise, shall continue to be available for the payment of dividends by the surviving corporation. The shareholders and directors of the surviving corporation may, unless otherwise provided by its by-laws, hold their meetings and have an office or offices outside of the State of Michigan, and the directors may keep the books of the surviving corporation (subject to the requirements of the statutes of Michigan) outside the State of Michigan at such place or places as may be from time to time designated by the board of directors.

IN WITNESS WHEREOF, the parties to this agreement, pursuant to authority duly given by the respective boards of directors, have caused these presents to be executed by a majority of the directors of each corporation party hereto, and the corporate seal of each such corporation affixed.

COPPER RANGE COMPANY

By [illegible]

[illegible]

Stephen Paul [illegible]

Robert H. Gross

[illegible]

John E. Thayer

James A. Ackroyd

A majority of the directors.

Attest:

James A. Ackroyd

Secretary

C. G. HUSSEY & COMPANY

By [illegible]

Robert H. Gross

[illegible]

A majority of the directors.

Attest:

[illegible]

Secretary

I, J. A. ACKROYD, Secretary of COPPER RANGE COMPANY, a corporation of the State of Michigan, hereby certify, as such Secretary and under the seal of that corporation, that the Agreement of Merger on which this certificate is made, after having been first duly signed by a majority of the directors of said corporation and by a majority of the directors of C. G. Hussey & Company, a corporation of the Commonwealth of Pennsylvania, was duly submitted to the stockholders of said Copper Range Company at a special meeting of said stockholders called separately for the purpose of considering and taking action upon said Agreement of Merger and held after due notice on the 24th day of December, 1936, that more than two-thirds of the total number of shares of the outstanding capital stock of said Copper Range Company was represented at said meeting, and that at said meeting the votes of the stockholders of said Copper Range Company representing more than two-thirds of the total number of shares of its outstanding capital stock were cast by ballot in favor of the adoption of said Agreement of Merger which Agreement of Merger was thereupon at said meeting duly adopted as the act of the stockholders of said Copper Range Company.

WITNESS my hand and the seal of said Copper Range Company this 24 day of December, 1936.

James A. Ackroyd
Secretary

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I, F. W. PAINE, Secretary of C. G. HUSSEY & COMPANY, a corporation of the Commonwealth of Pennsylvania, hereby certify, as such Secretary and under the seal of that corporation, that the Agreement of Merger on which this certificate is made, after having been first duly signed by a majority of the directors of said corporation and by a majority of the directors of Copper Range Company, a corporation of the State of Michigan, was duly submitted to the stockholders of said C. G. Hussey & Company at a special meeting of said stockholders called separately for the purpose of considering and taking action upon said Agreement of Merger and held after due notice on the 24th day of December, 1936, that more than two-thirds of the total number of shares of the outstanding capital stock of said C. G. Hussey & Company was represented at said meeting, and that at said meeting the votes of the stockholders of said C. G. Hussey & Company representing more than two-thirds of the total number of shares of its outstanding capital stock were cast by ballot in favor of the adoption of said Agreement of Merger which Agreement of Merger was thereupon at said meeting duly adopted as the act of the stockholders of said C. G. Hussey & Company.

WITNESS my hand and the seal of said C. G. Hussey & Company this 24th day of December, 1936.

F. W. Paine
Secretary

THE ABOVE AGREEMENT OF MERGER having been executed by a majority of the board of directors of each corporate party thereto, and having been submitted to the stockholders of each corporate party thereto at special meetings thereof separately called therefor, in accordance with the statutes of the State of Michigan and the Commonwealth of Pennsylvania, respectively, and having been adopted by the votes cast by ballot of the stockholders of each corporate party thereto representing more than two-thirds of the total number of shares of the outstanding capital stock of each corporate party, all in accordance with the statutes of the State of Michigan and Commonwealth of Pennsylvania, and that fact having been certified on said Agreement of Merger by the secretary of each corporate party thereto, the President or the Vice President and the Secretary or an Assistant Secretary of each corporate party thereto do now hereby execute the said Agreement of Merger under the corporate seals of their respective corporations, by authority of the directors and stockholders thereof, as the respective act, deed and agreement of each of said corporations, on this 14 day of December, 1936.

COPPER RANGE COMPANY

[signature]
Vice President

ATTEST:

James A. Ackroyd
Secretary

James A. Ackroyd
Secretary

C. G. HUSSEY & COMPANY

[signature]
Vice President

ATTEST:

[signature]
Secretary

[signature]
Secretary

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COMMONWEALTH OF MASSACHUSETTS)
) ss:
COUNTY OF SUFFOLK)

On this 24th day of December, A. D. 1936, before me, a Notary Public in and for said county, in the Commonwealth aforesaid, personally appeared [illegible], the Vice President of COPPER RANGE COMPANY, a corporation of the State of Michigan, known to me to be the person whose name is subscribed to the foregoing Agreement of Merger as such Vice President, and who is personally known to me to be the Vice President of such corporation, and acknowledged that he signed, sealed and delivered the said Agreement of Merger as his free and voluntary act, as such Vice President, and as the free and voluntary act, deed and agreement of said corporation, for the uses and purposes therein set forth, and further acknowledged said Agreement of Merger to be the act, deed and agreement of said corporation, all by authority of the board of directors of said corporation, and by authority of a resolution adopted by ballot at a special meeting of the stockholders of said corporation duly called and held according to the statutes of the State of Michigan governing the merger and consolidation of corporations, by the affirmative vote cast by ballot of the stockholders representing more than two-thirds of the total number of shares of the capital stock of said corporation.

John M. Foster
Notary Public

My Commission Expires: April 24, 1942

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COMMONWEALTH OF MASSACHUSETTS)
) ss:
COUNTY OF SUFFOLK)

On this 24th day of December, A. D. 1936, before me, a Notary Public in and for said county, in the Commonwealth aforesaid, personally appeared [illegible], the Vice President of [illegible] COMPANY, a corporation of the Commonwealth of Pennsylvania, known to me to be the person whose name is subscribed to the foregoing Agreement of Merger as such Vice President, and who is personally known to me to be the Vice President of such corporation, and acknowledged that he signed, sealed and delivered the said Agreement of Merger as his free and voluntary act, as such Vice President, and as the free and voluntary act, deed and agreement of said corporation, for the uses and purposes therein set forth, and further acknowledged said Agreement of Merger to be the act, deed and agreement of said corporation, all by authority of the board of directors of said corporation, and by authority of a resolution adopted by ballot at a special meeting of the stockholders of said corporation duly called and held according to the statutes of the State of Michigan and the Commonwealth of Pennsylvania governing the merger and consolidation of corporations, by the affirmative vote cast by ballot of the stockholders representing more than two-thirds of the total number of shares of the capital stock of said corporation.

John M. Foster
Notary Public

My Commission Expires: April 24,1942

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK) ss:

On this 24th day of December, A. D. 1936, before me, a Notary Public in and for said county, in the Commonwealth aforesaid, personally appeared P. F. BEAUDIN, the Vice President of C. G. HUSSEY & COMPANY, a corporation of the Commonwealth of Pennsylvania, known to me to be the Vice President of such corporation, and made oath that said C. G. Hussey & Company has complied in all respects with the laws of the Commonwealth of Pennsylvania, the state of its incorporation, in effecting the merger with COPPER RANGE COMPANY, a Michigan corporation, pursuant to the foregoing Agreement of Merger to which this affidavit is attached.

P. F. Beaudin
Vice President of
C. G. Hussey & Company

Subscribed and sworn to before me this 24th day of December, 1936.

John M. Foster
Notary Public

My Commission Expires April 24, 1942

MICHIGAN CORPORATION AND SECURITIES COMMISSION

DEC 30 1936

AGREEMENT OF MERGER

COPPER RANGE COMPANY

And

C. G. HUSSEY & COMPANY

Dated: November 24, 1936

24 folios.

ROPES, GRAY, BOYDEN & PERKINS,
50 FEDERAL STREET,
BOSTON

FILED

DEC 30 1936

Alvin E. Alexander

COMMISSIONER
MICHIGAN CORPORATION AND SECURITIES COMMISSION

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ANNUAL REPORT

OF THE

COPPER RANGE COMPANY

FOR THE YEAR ENDING

December 31, 1951

Copper Range Company

OF MICHIGAN

Directors

For the term ending May, 1952

Philip F. Beaudin — Edward Cunningham — W. Cameron Forbes

For the term ending May, 1953

John M. Foster — Morris F. LaCroix — John P. Lally

For the term ending May, 1954

Stephen Paine — Albert Pratt
Harold C. Schulte — Sydney M. Williams

Officers

President	Morris F. LaCroix
Vice President	John P. Lally
Vice President	Philip F. Beaudin
Vice President	Frank A. Ayer
Vice President	Ralph W. Myers
Treasurer	David M. Goodwin
Comptroller	Robert McArthur
Secretary	J. Roland Ackroyd
Assistant Treasurer	Henry Combellack
Asst. Treas. and Asst. Sec.	J. Sidney Leonard
Assistant Secretary	William P. Nicholls
Assistant Secretary	Harold L. Blaisdell

General Office: 24 Federal Street, Boston 10, Mass.
Assistant to the President: Harold B. Ewoldt

Mine Office: Painesdale, Michigan
General Manager of Mining Properties: W. E. Romig

C. G. Hussey & Company Division: Pittsburgh, Pa.
(Copper and Brass Rolling Mills)

Transfer Agents

Rockland-Atlas National Bank of Boston, 30 Congress Street
Guaranty Trust Company of New York, 140 Broadway

Registrars

The National Shawmut Bank of Boston, 40 Water Street
The Chase National Bank of the City of New York, 11 Broad Street

Annual Meeting: First Wednesday in May

Copper Range Company

To the Stockholders:

This is the annual report of the Copper Range Company including a consolidated balance sheet and income statement for the year 1951.

The net income of the Company for the year 1951 was $1,041,822.36 after depreciation and provision for taxes. This compares with $1,716,669.44 for the preceding year. Cash dividends in the amount of $564,654.80 equivalent to 80 cents per share were paid during the year.

The comparatively lower earnings for the year are the result in large part to the lower grade of ore mined from the East Vein of the Champion Mine, to substantially higher costs and the added impact of higher Federal Taxes.

C. G. Hussey & Company Division

The C. G. Hussey & Company Division continued to operate on a satisfactory basis throughout the year, although the volume of production was regulated through the application of the Controlled Materials Plan under the National Production Authority. During the year and at the request of the National Production Authority, a portion of our capacity was devoted to the manufacture of copper bus bar thus aiding in relieving a shortgage of copper conductors caused by the increased power expansion required for defense purposes. The year closed with an adequate backlog of orders for first-quarter production.

Our equipment for the casting and fabricating of copper alloy billets was thoroughly rehabilitated and the Company now has adequate facilities for the production of brass and bronze strip for ammunition or other uses necessary in the National Defense effort.

During the year plans for the conversion of all coal fired facilities with equipment to operate interchangeably with natural gas, fuel oil or electric power, were completed. This was done to insure reasonable protection against interruptions due to fuel and power shortages such as have occurred in the past. The Company continued its policy of plant improvement and has maintained the standard of high quality of Hussey products.

A new labor contract increasing hourly rates of pay was made effective on October 7, 1951 and labor relations continue on a satisfactory and sound basis.

Mining Division

Mining was carried on throughout the year in the East Vein of the Champion Mine. The program of increasing tonnage was continued throughout the year although progress was not as rapid as desired. A total of 206,831 tons of ore were shipped to the mill producing 1,851,521 pounds of refined copper, an average of 9.0 pounds of refined copper per ton. The comparatively low yield was the result of a substantial decrease in values on the north end of the Ninth and Tenth levels, to the mining of submarginal areas, and to a heavy overdraw from old stopes. Development and preparation work during the year was in excess of that required to replace the tonnage milled. Broken ore reserves were increased during the year from 101,000 tons to 133,000 tons at the end of the year.

Development work on the Fourteenth level started early in the year and while values at the north end of the mine have been generally disappointing the present showings on the Twelfth and Fourteenth levels are encouraging.

On September 16th a wage increase was made subject to the approval of the Wage Stabilization Board. Concurrent increases in the cost of materials and supplies made it impossible to continue production on an economical basis at the ceiling price of 24.5 cents per pound. Consequently, the Company immediately began negotiations with the Defense Materials Procurement Agency for a subsidy to cover the current costs of production. By the end of the year an understanding had been reached with the Government whereby it agreed to pay to this Company subsidy payments with respect to copper produced from the East Vein (estimated during the two-year term of this contract at 6,372,000 pounds) equal to the difference between the ceiling price and 33.8 cents per pound. The understanding was formalized in an agreement with the Defense Materials Procurement Agency dated March 19, 1952 and is retroactive to January 1, 1952. The agreement terminates on December 31, 1953. Furthermore, it may be canceled on sixty days' notice by either the Government or the Company and will end automatically when copper price controls are removed.

The Mill at Freda operated throughout the year. In July regrind and concentrate cleaning circuits were put into operation which have raised the average grade of concentrate from 48 per cent to 60 per cent without increasing the over-all milling costs and without additional capital expenditures. This improvement in the concentrate grade is being reflected in savings in smelting costs. The Freda stamp sands have not replaced themselves in any substantial amount and consequently the reclamation plant has not been operated during the past four years. Preliminary experimental work was started on the Redridge sands late in the year, but to date no improvements had been made in the metallurgy.

Douglass Lease

The Douglass property under lease to the Calumet and Hecla Consolidated Copper Company produced 7,171,784 pounds of copper in 1951 as compared with 8,109,962 pounds in the preceding year. The average grade of ore increased from 21.8 pounds to 23.3 pounds per ton. Although the larger part of the production came from the Kearsarge Lode, a substantial tonnage was mined from the Houghton Conglomerate where development is continuing with satisfactory results.

Land Department

The harvesting of timber from lands owned by the Company under the selective cutting and timber management plan continued during the year. Approximately 7,054,588 feet b.m. of timber was harvested and sold as compared with 7,961,202 feet b.m. during 1950. The net income for this year after property taxes and depletion and resulting principally from the sale of timber was $52,949.70 as compared with $43,399.52 in the prior year.

The program of reforestation and tree planting which began in 1950 was carried on during the spring and fall seasons of 1951 and 200,000 Norway pine seedlings were planted in the "William Paine LaCroix Memorial Plantation," which is located west of the Atlantic Mine in Houghton County. A total of 440,000 Norway pines have been set out in this Plantation and the survival experience, especially with the trees planted in the spring, has been very good. The soundness of our plans for the conservation of our forests through a controlled management plan and for reforestation is becoming apparent.

This department managed the rentals, farm lands and other real estate owned by the Company and carried out various purchases and exchange of lands in accordance with our program of acquisition. Also it maintained all land records and supervised the payment of the general property taxes on all lands owned by the Company in twenty-eight townships in the six counties in the western part of the Upper Peninsula.

Copper Range Railroad Company

The Copper Range Railroad Company increased its business and revenues during the year as compared with 1950, but again higher cost factors due to wage increases coupled with retroactive pay and increased operating expenses had an adverse effect on earnings. Further mechanization and increased efficiency of operation this year offset the higher cost factors only to a limited extent. Net Earnings from operations for the year were $42,450.18 as compared with $22,243.07 in 1950.

It is apparent that the economy of the territory served cannot be expected to produce substantial increases in revenue freight and experience indicates that necessary additional income derived from increased freight rates not only serves to generate demands for increased wages but places the Company in an increasingly difficult competitive position with trucking and other transportation services.

Copper Range Motor Bus Company

The Copper Range Motor Bus Company carried a total of 489,174 passengers during the year, as compared with 594,381 passengers in 1950. For the past three years the Company has experienced substantial decreases in the passenger load resulting principally from the increased use of automobiles, unrestricted taxi competition, and a decline in population in the area served. The lower income, combined with a substantial increase in operating costs, resulted in a net income after federal taxes of $1,189.64 as compared with $4,961.21 for the previous year. Operating schedules have been revised and every effort is being made to operate economically and efficiently within the limits of our income and expected demand for service. The equipment has been well maintained and a twenty-one passenger coach was added to our fleet during the year.

White Pine Copper Company

Negotiations for the development of the White Pine ore body initiated by the Government in September, 1950, were carried on throughout the year with the several agencies charged with the responsibility of this project under the Defense Production Act.

The White Pine Copper Company, incorporated under the laws of the State of Delaware on November 21, 1950 and having an authorized capital of 300,000 shares of $10 par value, acquired 9,840 acres of the fee, mineral and surface rights initially required for the development of the project, including the ore body and all appurtenances, in consideration of the issue to Copper Range Company of 136,000 shares of its capital stock having an aggregate par value of $1,360,000. This is substantially the cost of these properties as acquired by Copper Range Company, plus certain exploration and development expenses charged to capital and does not necessarily represent the present value of the property or of the ore body. Furthermore, the Company may acquire from Copper Range Company such additional properties and rights as may be necessary to the proper development and completion of the project.

A loan in the amount of $57,185,000 was authorized by the Reconstruction Finance Corporation, acting under the Defense Production Act on November 15, 1951. Two amendments were made subsequently to reflect important changes in the terms and conditions of the original authorization. Under the Defense Production Act the Reconstruction Finance Corporation is the investigating, fiscal, and disbursing agent for the loan.

The terms of the Reconstruction Finance Corporation loan authorization as amended were set forth in the letter of the President dated March 15, 1952, sent to each stockholder with the notice of the Special Meeting of Stockholders held March 28, 1952, and are substantially as follows: The loan will mature twenty years from date and will carry interest at the rate of 5 per cent per annum payable quarterly. It will be subject to a fixed sinking fund beginning July 1, 1956, or eighteen months after completion of the White Pine Project, whichever is earlier, at the rate of $3,000,000 a year payable in quarterly instalments of $750,000 each.

The loan will also be subject to contingent sinking fund payments beginning February 28, 1957, and continuing annually thereafter, each in a sum equal to the amount by which 50 per cent of White Pine Copper Company's earnings (which for this purpose shall be calculated before deductions for depreciation, depletion, amortization and profits or losses resulting from the sale of fixed assets which are not mortgaged to secure the indebtedness, but after deductions for income taxes) for the immediately preceding fiscal year ending December 31 exceeds the aggregate amounts paid during such fiscal year under the fixed sinking fund provisions of the loan.

The loan authorization further provides that any tax savings resulting from accelerated amortization as permitted under Section 124(a) of the Internal Revenue Act of 1950, in respect of the years in which such accelerated amortization is taken, as determined by the Reconstruction Finance Corporation, shall be applied on account of the instalments of principal of the loan in the inverse order of maturity. No payment under this provision is required if the making thereof would, in the opinion of the Administrator of the Reconstruction Finance Corporation, impair the working capital or cash position of the White Pine Copper Company to such an extent that it would be inadequate for its corporate purposes.

The loan will be secured by a mortgage covering all the fixed assets now owned or hereafter acquired by the White Pine Copper Company, including all property acquired from the proceeds of the loan, and the authorization expressly provides that such proceeds shall be used solely for the costs and expenses in connection with the construction of the White Pine Project.

After completion of the White Pine Project as determined by the Chief Engineer of the Reconstruction Finance Corporation, and beginning with the operation as a completed project and continuing as long as the loan is outstanding, the White Pine Copper Company agrees to maintain its working capital position in an amount of not less than $3,000,000. Further, as long as the loan is outstanding, no dividend payments may be made by the White Pine Copper Company upon its capital stock without the prior written consent of the Reconstruction Finance Corporation Loan Administrator.

In addition to these major provisions of the loan authorization, there are certain customary provisions incident to Reconstruction Finance Corporation loans covering, in general, the approval of the plans, specifications and principal contracts in connection with the construction of the project, methods of disbursement of the loan and related matters.

The $57,185,000 loan to the White Pine Copper Company does not provide funds for the initial working capital requirements of the White Pine Copper Company or for interest during the construction period. These funds are to be supplied by the Copper Range Company.

Copper Range Company will agree with the Reconstruction Finance Corporation to advance or pay to the White Pine Copper Company funds not in excess of $3,000,000 to provide the initial working capital for the White Pine Copper Company. The total amount of interest during construction will depend upon the rate at which the funds are taken down and is now estimated at $4,500,000 to $5,000,000. In addition to the foregoing, Copper Range Company will agree to advance $5,000,000 to the White Pine Copper Company at the rate of $1,000,000 annually for the period of five calendar years following the completion of the White Pine Project, these advances to be applied by the White Pine Copper Company to such of its corporate purposes as shall be approved by the Reconstruction Finance Corporation.

These payments and advances by Copper Range Company to the White Pine Copper Company, aggregating approximately $13,000,000, are to be evidenced by equity securities of the White Pine Copper Company or by indebtedness of the White Pine Copper Company subordinated to the Reconstruction Finance Corporation loan in respect of both principal and interest. Copper Range Company at its option may prepay any of such commitments.

Copper Range Company will agree that it will not (a) declare or pay any dividends in cash or property (i) in excess of the amount per share (80 cents) paid for the year 1951 on the 706,250 shares of its capital stock now outstanding without the prior written consent of the Administrator of the Reconstruction Finance Corporation, and (ii) in any amount if any of its commitments in respect of the loan of Reconstruction Finance Corporation to the White Pine Copper Company are in default; or (b) pledge, mortgage, or otherwise cause or permit to be encumbered in any manner whatsoever, any of its fixed assets. The agreement between the Copper Range Company and the Reconstruction Finance Corporation will expressly provide that the restrictions set forth in items (a) and (b) of this paragraph shall be completely null and void when the Copper Range Company has made the payments to the White Pine Copper Company referred to above aggregating approximately $13,000,000.

The payments to White Pine Copper Company referred to above will be reflected on the balance sheet of Copper Range Company by increases in its investment account as such cash is advanced to its wholly-owned subsidiary. While such advances will be substantial, your management feels that they can be made without impairing the adequate working capital position of the Copper Range Company. As you know, Copper Range Company has been accumulating funds for some years for the purpose of developing its White Pine property. As at December 31, 1951 Copper Range Company held cash or its equivalent in United States Government securities aggregating approximately $9,000,000. Of this amount at least $6,000,000 is now available for the White Pine project. It is estimated that the balance of the Copper Range Company commitment of about $7,000,000 will become available as required through earnings and improvement in cash position due to tax savings and accelerated amortization in connection with the project.

On November 16, 1951 the Defense Production Administration certified to the Commissioner of Internal Revenue that, subject to certain conditions, the facilities to be constructed or acquired are necessary in the interest of national defense during the emergency period. The estimated net cost of the facilities to which the increased depreciation deduction will be allowed is $40,912,000. The aggregate amount of the accelerated depreciation which may be taken during the five calendar year period after completion of the project, is approximately $28,664,500. In view of the many indeterminate factors involved in the application of the permissible accelerated amortization, no estimate of its use can be made at this time.

On February 25, 1952, the White Pine Copper Company entered into a contract with the Government, acting through the Defense Materials Procurement Agency, for the production and disposition by the White Pine Copper Company of an estimated 275,000 short tons (550,000,000 pounds) of refined copper. Under this agreement the Defense Materials Procurement Agency will pay 25.5 cents a pound (subject to adjustment as indicated below) for copper produced at the White Pine Mine. This is one cent above the present domestic ceiling price of 24.5 cents a pound for copper.

White Pine Copper Company has the right to require the Government to purchase up to 243,750 short tons (487,500,000 pounds) of the first 275,000 short tons of copper produced by the White Pine Copper Company at the floor price of 25.5 cents per pound, adjusted in accordance with changes in certain Government labor and commodity indices, reflecting changes in labor, material and other costs, as published by the United States Department of Labor, Bureau of Labor Statistics. The Government retains an option to buy all of the copper produced during the term of the contract at the higher of the then market price and the 25.5 cents floor price as adjusted by index changes. The contract terminates on December 31, 1961, subject to earlier termination upon certain contingencies.

It is believed that this contract should materially assist the White Pine Copper Company in meeting the terms of its Government loan.

During the year 2,788 tons of ore were mined at White Pine and sent to the pilot mill for testing purposes. The ore was mined in two stopes in order to secure as representative a grade as possible. Experiments in stoping and methods of breaking were carried out in producing this ore. These tests, although necessarily limited by the small tonnage, have given valuable preliminary information on mining methods.

The pilot mill was operated continuously throughout the year on a three-shift basis. Further substantial improvements were made in metallurgy as a result of this work and the research carried out in the laboratory. Further improvements can be expected and the work being carried out is of the highest technical quality and has proved eminently helpful in the preliminary design of the flow sheet and mill.

The pilot plant for roasting and leaching the concentrates continued in operation until December and all results were examined for certification by engineers of the Battelle Memorial Institute, after which these tests were concluded. While the results of this work were satisfactory, the indicated capital costs precluded the use of this method for the recovery of copper.

Under our agreement with the Reconstruction Finance Corporation the planning, designing and construction work on the site was started shortly after the first of March. The scope of the work is being set out in a comprehensive Manual of Procedure and plans call for limited production of copper about the middle of 1954 with completion scheduled by the end of that year.

General

Taxes consisting of Social Security, State and local taxes and Federal income and excess profits taxes for 1951 were $1,832,360 equivalent to $2.60 per share on the shares outstanding as of December 31, 1951.

As stated in our Annual Report of last year, the income tax returns for the years 1946 through 1948 are under examination, including adjustments incident to the abandonment of the Globe property which occurred in 1946.

John V. O'Connor, Jr., Assistant Sales Manager of the Hussey Division, was given a leave of absence on June 30, 1951 to enable him to take an official position in the Brass Mill Section of the Copper Division, National Production Authority in Washington. His leave has been extended and he is now Chief of that Section.

John R. Rand was appointed Geologist on July 15, 1951.

The Board of Directors and the Officers appreciate the loyalty and faithful service of the many employees that make up our organization.

The books of the Company and affiliated companies have been audited by Scovell, Wellington & Company, and their certification is submitted with this report.

By order of the Board of Directors,

MORRIS F. LACROIX,
President

April 14, 1952

Comparative Financial Data

	Sales of Copper and Copper Products	Other Income Net	Consolidated Net Income Before Depletion and Federal Taxes	Federal Taxes on Income	Net Income	Dividends Paid	Capital Expenditures	Current Assets	Current Liabilities	Net Current Assets
1940	$ 7,042,145	$ 20,528	$ 917,873	$ 84,000	$ 833,873	$169,485	$ 52,553	$ 3,988,891	$1,040,166	$2,948,725
1941	10,420,558	83,274(1)	1,616,854	270,000	1,346,854	282,474	115,172	4,887,113	756,116	4,130,997
1942	8,672,816	159,047	1,056,940	233,300	823,640	423,711	71,436	5,325,851	597,563	4,728,288
1943	14,983,897	193,864	1,636,695	463,710	1,172,985	423,696	169,748	6,615,079	1,199,047	5,416,032
1944	17,695,317	339,672	1,234,381	308,950	925,431	423,696	185,722	7,085,295	1,154,308	5,930,987
1945	14,425,236	211,229	904,117	279,150	624,967	423,696	204,460	6,829,079	733,252	6,095,827
1946	14,721,174	255,487	1,283,105	460,500	822,605	423,696	634,632	7,642,313	1,595,587	6,046,726
1947	15,880,074	443,315(2)	1,564,812	573,760	991,052	423,696	557,652	8,405,974	1,404,142	7,001,832
1948	16,665,064	250,705	1,568,559	552,000	1,016,559	423,696	228,268	8,899,063	1,419,563	7,479,500
1949	12,875,560	280,355	1,128,015	366,785	761,230	451,942	243,002	8,816,950	1,128,459	7,688,491
1950	20,987,903	267,710(2)	3,103,102	1,386,432	1,716,670(3)	451,942(4)	333,879	11,611,072	2,722,057	8,889,015
1951	21,468,927	404,571	2,596,216	1,554,393	1,041,823	564,655	238,806	12,362,617	3,023,430	9,339,187

The Consolidated Net Income for the years 1942 and 1943 is after giving effect to Renegotiation of Government Contracts made in years subsequent to those affected.

No retroactive adjustments have been made in respect of final settlement of Federal income taxes.

(1) Excluding non-recurring loss from sale of preferred stock of Copper Range Railroad Company $248,675.

(2) Excluding non-recurring loss in 1947 from sale of Copper District Power Company preferred and common stocks of $148,131, and non-recurring profit in 1950 from sale of common stock of Upper Peninsula Power Company $93,803.

(3) Excluding $1,118,044 in respect of abandonment and write off of Globe mine, and including $83,567 from reserve for additional Federal income taxes not required in settlement of taxes of prior years.

(4) In addition a 25% stock dividend in the amount of 141,250 shares was paid December 29, 1950.

Copper Range Company and Wholly Owned Subsidiaries

CONSOLIDATED BALANCE SHEET as at DECEMBER 31, 1951

ASSETS

Cash		$ 1,981,381.94	
U. S. Government securities, at cost		7,010,501.00	
Accounts and notes receivable, trade	$1,152,265.65		
Less Reserve for bad debts	70,485.83	1,081,779.82	
Accounts and notes receivable, other		123,296.29	
Inventories (Note 2)		1,850,169.06	
Supplies, at lower of cost or market		233,929.65	
Prepaid expenses		81,558.95	
Total current assets			$12,362,616.71
Investments			
Copper Range Railroad Company (Note 3)			
8,034 shares 5% non-cumulative preferred stock, at cost (Note 4)		623,616.01	
15,704 shares common stock (Note 4)		429,091.89	
Sundry investments in other companies, at cost or nominal value		2,544.00	1,055,251.90
Plant and properties, as valued by directors as at December 31, 1931, plus additions at cost			
Mines, lands, mineral rights and developments, and timber tracts, without deduction for depletion (Note 1)		4,362,515.43*	
Buildings and machinery at smelter and mines, and motor bus properties	5,025,367.80		
Less Reserves for depreciation	4,818,730.80	206,637.00	
Plant and equipment of C. G. Hussey & Company Division, at book values of predecessor corporation plus additions at cost	2,736,839.68		
Less Reserves for depreciation	1,167,753.54	1,569,086.14	6,138,238.57
Other assets			
Employees retirement plan past service costs deferred		128,668.01	
Other deferred expenses		3,806.38	132,474.39
			$19,688,581.57

LIABILITIES

Accounts payable		$ 922,752.09	
Federal income and excess profits taxes (Notes 1 and 5)		1,678,000.00	
Accrued wages, state and local taxes and other expenses		390,277.77	
Advance payments on contracts		32,399.68	
Total current liabilities			$ 3,023,429.54
Reserve for copper inventory liquidation less federal taxes			28,219.22
Employees retirement plan past service premium, due 1953–1957			98,741.14
Capital stock, without par value Authorized 1,500,000 shares Issued 706,250 shares, of which 3,208 shares are reserved for exchange for Boston and Lake Superior Mineral Land Company stock, less 92 shares in treasury, at cost			10,732,852.05
Capital surplus			1,997,947.55
Earned surplus (since January 1, 1932), December 31, 1950		3,330,224.51	
Net income for year ended December 31, 1951, without deduction for depletion (Notes 1, 3 and 5)	$1,041,822.36		
Dividends paid	564,654.80	477,167.56	
Earned surplus (since January 1, 1932), December 31, 1951			3,807,392.07
			$19,688,581.57

* Includes White Pine property at approximate cost of $1,365,000, transferred in 1952 (with approval by stockholders March 28, 1952) to wholly owned subsidiary, White Pine Copper Company, for 136,000 shares of capital stock, $10 par. Subsidiary is to receive twenty-year 5% mortgage loan of $57,185,000 on White Pine property through Reconstruction Finance Corporation acting under Defense Production Act of 1950 as amended, for development of ore body and construction of mine, mill, smelter and housing facilities, loan being payable beginning July 1, 1956, or eighteen months after completion of project, at $3,000,000 a year in quarterly instalments of $750,000 each. Copper Range Company is to advance to subsidiary not in excess of $3,000,000 for initial working capital, an estimated $4,500,000 to $5,000,000 for interest during construction and $5,000,000 ($1,000,000 a year after completion of project) for corporate purposes approved by R.F.C., payment for such advances totaling approximately $13,000,000 to be made in equity securities of White Pine or by indebtedness of White Pine subordinated to mortgage loan as to principal and interest.

(See other notes to financial statements on following page)

Copper Range Company and Wholly Owned Subsidiaries

CONSOLIDATED INCOME STATEMENT

For the Year ended December 31, 1951

Sales of copper and copper products (Note 5)			$21,468,927.44
Cost of sales (Notes 1 and 2)			
Including mine shut-down and operating expense; taxes; fabricating costs; and depreciation of mine machinery and structures, and fabricating plant, $108,645.20		$17,551,196.45	
Selling and administrative expenses		1,673,860.35	
Retirement plan expense		52,225.71	19,277,282.51
Profit from copper operations			2,191,644.93
Other operating income			
Royalty		169,166.85	
Sales of timber, land rentals, etc., net		52,949.70	
Rental of dwellings		15,608.33	
Miscellaneous		1,677.71	239,402.59
			2,431,047.52
Non-operating income			
Dividend from Copper Range Railroad Company		12,051.00	
Interest		91,138.30	
Rents and sundry, net		13,116.72	
Gain on plant assets sold		20,488.12	
Miscellaneous		29,971.48	
		166,765.62	
Deduct			
Interest on prior years' federal income taxes	$ 316.90		
Sundry	1,280.44	1,597.34	165,168.28
Income before federal taxes on income			2,596,215.80
Provision for federal taxes on income (Notes 1 and 5)			
Normal tax and surtax		1,232,000.00	
Excess profits tax		327,000.00	
		1,559,000.00	
Deduct Adjustment of prior years' taxes, net		4,606.56	1,554,393.44
Net income for year, without deduction for depletion — to earned surplus (Notes 1, 3 and 5)			$ 1,041,822.36

Notes to Financial Statements

Note 1 — During 1951, except for depletion of timber lands for sales of timber, no depletion has been recorded on the books or included in expenses on the financial statements. In estimating the provision for federal taxes on income, however, depletion for ore recovered from the Champion mine amounting to $53,523.11 based on the March 1, 1913 value as determined by the Treasury Department, and depletion on Douglass Copper lands amounting to $25,375.03, is taken into account. The values at which the mining properties are carried on the books do not represent current realizable values.

Note 2 — Metal contents of inventories of the fabricating division are stated at cost on the basis of the last-in first-out inventory method (adopted January 1, 1946), which is below market as at December 31, 1951. Labor and burden costs applied to goods in process and finished goods are based on average current costs for the year. All other inventories are stated at the lower of cost or market on the basis of first-in first-out.

Note 3 — The equity of the company in the net income of the Copper Range Railroad Company (not consolidated in these statements) for the year ended December 31, 1951 amounted to $30,273.31, and the equity in the net assets of that company as shown by its books at December 31, 1951 was $2,992,694.37.

Note 4 — Of the capital stock of Copper Range Railroad Company owned by Copper Range Company, the 8,034 shares of 5% non-cumulative preferred stock and 1,441½ shares of the 15,704 shares of common stock are carried at cost. The remaining 14,262½ shares of common stock are carried at $30 a share as determined by the directors in 1931. The values at which the shares of Copper Range Railroad Company are carried on the books of Copper Range Company do not represent current realizable value.

Note 5 — The company is subject under federal statutes to renegotiation of government contracts. The effect of such renegotiation on the accompanying financial statements cannot now be determined, and the statements as submitted are subject to such adjustments as may result from renegotiation.

Scovell, Wellington & Company
Accountants and Auditors

Boston, April 4, 1952

To the Board of Directors of
Copper Range Company

We have examined the consolidated balance sheet of Copper Range Company and its wholly owned subsidiaries as at December 31, 1951, and the related consolidated income statement for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

The practice of the company in computing consolidated net income without deduction for depletion of metal mines is in accordance with accepted accounting procedures in the copper-mining industry, and is in agreement with long established and consistently maintained accounting practices of the company and others similarly situated.

In our opinion, the accompanying consolidated balance sheet and consolidated income statement, and the notes thereto, present fairly the financial position of Copper Range Company and its wholly owned subsidiaries at December 31, 1951, and the results of their operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Scovell, Wellington & Company

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ANNUAL REPORT

TO SHAREHOLDERS

FOR THE YEAR ENDED DECEMBER 31, 1956

COPPER RANGE COMPANY

and its wholly owned subsidiary

WHITE PINE COPPER COMPANY

COPPER RANGE COMPANY

GENERAL OFFICE

24 Federal Street, Boston 10, Massachusetts

MINE OFFICES

White Pine, Michigan
Painesdale, Michigan

ROLLING MILLS

C. G. Hussey & Company Division, Pittsburgh, Pennsylvania

BRANCH WAREHOUSES

Cleveland 3, Ohio — 5318 St. Clair Avenue
Cincinnati 37, Ohio — 1045 Meta Drive
Chicago 18, Illinois — 3900 N. Elston Avenue
St. Louis 1, Missouri — Central Terminal Building
Philadelphia 30, Pennsylvania — 1632 Fairmount Avenue
New York City 6 — Long Island City, 34-39 Thirty-first Street

TRANSFER AGENTS

Rockland-Atlas National Bank of Boston
Guaranty Trust Company of New York

REGISTRARS

The National Shawmut Bank
of Boston

The Chase Manhattan Bank
New York

COPPER RANGE COMPANY

DIRECTORS

NELSON J. DARLING, JR.
Partner in the firm of Paine, Webber, Jackson & Curtis, Boston, Mass.

JOHN M. FOSTER
Partner in the law firm of Ropes, Gray, Best, Coolidge & Rugg, Boston, Mass.

IRA B. JORALEMON
Consulting Mining Engineer and Geologist, San Francisco, Calif.

JOHN P. LALLY
President of the Company

GEORGE OLMSTED, JR.
President of S. D. Warren Company, Boston, Mass.

STEPHEN PAINE
Trustee, Boston, Mass.

DONALD C. POWER
President of General Telephone Corporation, New York, N. Y.

JOHN R. RAND
Geologist, Portland, Maine

HAROLD C. SCHULTE
Attorney at Law, Houghton, Michigan

RUSSELL B. STEARNS
Chairman of Board of Directors of Colonial Stores Incorporated and President of National Food Products Corporation, Boston, Mass.

OFFICERS

President	JOHN P. LALLY
Vice President	NELSON J. DARLING, JR.
Vice President	JOHN V. O'CONNOR, JR.
Vice President	J. SIDNEY LEONARD
Treasurer	DAVID M. GOODWIN
Secretary	J. ROLAND ACKROYD
Comptroller	ROBERT H. JACOBSON
Assistant Treasurer	HENRY COMBELLACK
Assistant Secretary	HAROLD L. BLAISDELL

WHITE PINE COPPER COMPANY

(*Wholly Owned Subsidiary*)

OFFICERS

President	JOHN P. LALLY
Vice President	NELSON J. DARLING, JR.
Vice President	DAVID R. STRAUB
Vice President	WILLIAM P. NICHOLLS
Treasurer	DAVID M. GOODWIN
Secretary	J. ROLAND ACKROYD
Plant Comptroller	GEORGE R. MCGRATH

COPPER RANGE COMPANY

AND WHOLLY OWNED SUBSIDIARIES

Two Years in Brief

	1956	1955
Net Sales	[illegible]	$47,736,518
Earnings before Federal Income Taxes	[illegible]	$11,240,059
Provision for Federal Income Taxes	[illegible]	$ 2,200,000*
Net Earnings	[illegible]	$ 9,040,059*
Earnings per Share (based on 1,875,420 Shares outstanding December 31, 1956)	[illegible]	$4.82*
Dividends paid in cash	[illegible]	$ 621,419
Per Share — Cash	[illegible]	$ .40
Stock	[illegible]	5%
Capital Expenditures	[illegible]	$ 3,673,328
Depreciation, per books	[illegible]	$ 3,141,934
Net working capital	[illegible]	$26,486,265
Long-term debt	[illegible]	$59,100,876
Shareholders' equity	[illegible]	$40,361,203
Copper produced (pounds)	[illegible]	68,137,483
Average number of employees	[illegible]	1,950
Approximate number of shareholders	[illegible]	4,182
Shares outstanding	1,875,420	1,778,534

*Percentage depletion and accelerated amortization have been deducted for tax purposes only. These deductions resulted in a tax reduction of $3,570,000 in 1956 and $2,990,000 in 1955.

PRESIDENT'S LETTER

To the Shareholders:

I am pleased to report to you on the operations of your Company and its wholly owned subsidiary, White Pine Copper Company, for the year 1956.

Consolidated sales amounted to $49,387,988 this year as compared with $47,736,518 in 1955, and earnings before Federal income taxes were $12,230,972 compared with $11,240,059 in 1955. After provision for Federal income taxes, net income amounted to $9,155,972 this year as compared with $9,040,059 for 1955. Based on the 1,875,420 shares outstanding on December 31, 1956, this represents $4.88 per share this year as compared with $4.82 for 1955.

Cash dividends aggregating $1 per share were paid during the year compared with 40¢ per share paid in 1955. In addition to cash dividends, the Company paid a 5% stock dividend which is the same percentage paid in 1955.

Depreciation, as in prior years, has been taken on the books and included in the financial statements submitted herewith on the so-called "straight line method" based on the estimated useful life of the assets. Depreciation charged against income this year amounted to $3,859,577 as compared with $3,141,934 in 1955. In computing 1956 provision for Federal income taxes, the Company has deducted percentage depletion and, in respect to certain assets of White Pine Copper Company, accelerated amortization, pursuant to the provisions of the Certificate of Necessity issued by the Government which allows a charge-off for tax purposes of the cost of these assets, estimated at $34,700,000, over a period of five years. These deductions which are taken for tax purposes only, resulted in a tax reduction this year of $3,570,000.

At year end your Company was in a strong current position having $4,228,674 in cash and $18,217,891 in United States Government Bonds with consolidated net current assets amounting to $29,110,347. The ratio of current assets to current liabilities at December 31, 1956 was 6.2 to 1 as compared with 5.6 to 1 at December 31, 1955.

During the year 1956 the Government loan of White Pine Copper Company was reduced $7,504,602 from $59,100,876 on December 31, 1955, to $51,596,274 on December 31, 1956. At year end the fixed sinking fund installments due in 1957 and 1958 had been prepaid, together with the contingent sinking fund payments (on an estimated basis) due in 1957. Accordingly, no sinking fund payments, fixed or contingent, will be due on the loan in 1957 and only contingent sinking fund payments (one based on tax savings due to accelerated amortization and the other on 50% of defined earnings of White Pine Copper Company) will be payable in 1958, the amount of these 1958 payments depending upon the results of operations in 1957.

Production at the White Pine facilities in 1956 totaled 75,516,312 pounds of refined copper, of which 68,428,694 pounds were sold in the open market, including copper supplied for operations at our Hussey Division at regular market prices in effect on date of shipment.

The inventory of finished copper, at the mine and at refineries to be electrolyzed, at the beginning of 1956 amounted to 1,399,102 pounds and at year end 8,322,632 pounds. This increase in inventory was necessary in order to enable us to meet our electrolytic demand in the first quarter of 1957, as approximately 60 days are required for conversion into electrolytic copper.

No deliveries were made in 1956 to the Government under White Pine Copper Company's outstanding Procurement Contract covering its right to sell to the Government. At December 31, 1956, the Government's obligation to purchase at a floor price of 25.5 cents per pound, subject to escalation reflecting changes in labor, materials, and other costs, had been reduced from 487,500,000 pounds to approximately 200,000,000 pounds. The price established by the terms of this Procurement Contract would have been 28 cents per pound on December 31, 1956, which was lower than the prices we were obtaining in the open market.

During the year White Pine Copper Company added to its production copper cakes in a variety of sizes and weights up to 2,000 pounds each. These cakes are used for converting into sheet, roll, strip and other copper products. The first cakes were cast in July and by the year end over 12,000,000 pounds were produced and sold. This was in addition to the production of ingot copper. We have also provided for the conversion of some of our output into electrolytic copper. This enables us to meet the needs of all our customers.

In the latter part of 1956 the Company opened a Sales Office at 24 Federal Street, Boston, Massachusetts, to sell the production of White Pine Copper Company and Copper Range Champion Mine.

On February 5, 1957, Ira B. Joralemon was elected to the Board of Directors of the Company filling the vacancy caused by the resignation of Walter Hochschild. Mr. Joralemon is a mining engineer and geologist, a graduate of Harvard University and has always been active in the mining industry. Mr. Joralemon has been a consultant for the Company for many years and was one of our advisors during the early days of White Pine.

On December 12, 1956, Robert H. Jacobson was named Comptroller. Mr. Jacobson had been Assistant Comptroller of the Company since 1954. He relieves Robert McArthur whose retirement was announced on December 12, 1956. Mr. McArthur has been with the Company for over 15 years, and his ability and integrity have been valuable assets during his years of service.

I take this opportunity to express my sincere appreciation to our many valued customers for their continued confidence, and to our many faithful employees for their cooperation and loyalty which are so essential to the success of our Company.

I also wish to express appreciation for the confidence and loyalty of our many shareholders, and as always we will welcome inquiries at any time regarding the affairs of the Company.

A summary account of the results of the Company's operations in 1956 and those of its wholly owned subsidiary, White Pine Copper Company, including consolidated financial statements, is included in the following pages of this report.

Cordially,

J. P. Lally.

President

March 18, 1957

SUMMARY OF OPERATIONS

COPPER RANGE COMPANY

C. G. Hussey & Company Division

The Hussey operations during the first six months of 1956 continued at the high level of the previous year; however, a sharp decline in the price of copper during the last half of the year had an adverse effect on the Division's sales and production. Sales of copper products manufactured in our Pittsburgh mills, together with brass products sold through the Company's seven warehouses, amounted to $29,843,000 compared with $31,002,000 in 1955.

Inventories have been maintained at normal levels, and they are priced on a LIFO method of pricing which is substantially below market. We further strengthened our warehouse distribution system by replacing our New York and Cincinnati branches with new modern warehouse facilities. These moves will enable us to handle more efficiently the increasing demands of our customers in these areas, and will provide additional space and facilities for growth.

Maintenance and repair of mill facilities kept the plant in good order throughout the year, and the Division continued to supply customers with products of recognized high quality. The Hussey Division, through White Pine Copper Company, is now assured of a constant supply of copper to meet the future demands of customers.

In October the labor contract was opened for discussion of uniform hourly rates of pay, and was settled without loss of time on a mutually satisfactory basis. A very friendly and cooperative spirit exists between the Union and Management.

During the year J. R. Lally was appointed Sales Manager of the Hussey Division, succeeding J. V. O'Connor. Mr. Lally has been associated with the Company for many years, and has been Assistant Sales Manager for the past several years.

Champion Mine and Freda Mill

The Champion Mine operated throughout the year without any interruptions. In addition to maintaining a balanced position in ore reserves, 400,787 tons of copper rock were shipped to the Freda concentrator. The grade of ore improved slightly in comparison with the previous year; however, dilution of stope rock continues to decrease the copper content. To maintain the water level below the 18th level, pumps were installed in No. 3 shaft the early part of the year and have operated satisfactorily. Maintenance and repair of mine facilities were carried on at a normal rate.

The concentrating plant at Freda processed 400,787 tons of copper rock from the Champion Mine, from which 4,337,965 pounds of refined copper was recovered. The average recovery for the year was 12.39 pounds of copper per ton of rock with an average tailings loss of 1.35 pounds. Rehabilitation of No. 8 unit was completed and the unit placed in operation. All units now are available for operation as rock is available. The average over-all daily tonnage processed was 1,416 tons in comparison with 1,129 tons for the previous year.

Facilities to test the tailings at the Freda Mill from the Baltic and Atlantic Mills were completed in May. There were 107,558 tons of Redridge sands processed at Freda during the year, from which 571,935 pounds of refined copper were recovered.

Dwg 1956

Pursuant to the provisions of the Champion Mine Maintenance contract with General Services Administration as extended, 1,786,710 pounds of copper were delivered to the Government at 31 cents per pound. Delivery dates under this contract have been extended to July 31, 1957, and the balance of copper deliverable to the Government under such contract prior to its termination date is 749,272 pounds. The 1956 Champion Mine production in excess of requirements of the General Services Administration contract, amounted to 2,551,255 pounds and was sold to fabricators.

Labor relations remained satisfactory throughout the year with uninterrupted operations. Negotiations for a one-year labor contract with the United Steelworkers of America, C.I.O., Local No. 5008, were concluded on a satisfactory basis in December, 1956.

Douglass Mine

In September, 1941, your Company leased for a term of twenty-five years, the right to mine its Douglass property on a royalty basis. The royalty to be payable either in cash or copper at the election of the lessor. During 1956 your Company accepted copper, in payment of such royalty, which was shipped to our Hussey Division in Pittsburgh.

Land Department

Approximately 7,800,000 feet b.m. of timber were harvested and sold during the year compared with 4,600,000 feet b.m. during the year 1955. The net income of this department after property taxes and depletion, resulting principally from the sale of timber, was $129,704 as compared with $40,733 in the prior year.

The increase in profit reflects the increased demands for lumber and pulpwood products. The profits of 1956 were also aided by favorable weather conditions.

The harvesting of our timber has been carried out in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply, protecting our water sheds and stream flow, providing recreational facilities, added game cover and contributing to the economic stability of our communities. Over 50,000 Norway pine seedlings were planted during the spring planting season in the "William Paine LaCroix Plantation", making a total of over 900,000 trees planted to date. The growth and survival experience of these trees has been most satisfactory.

Copper Range Railroad Company

Operating revenues of the Copper Range Railroad Company were $630,969 and the operating expenses, including rentals and taxes, amounted to $611,391, resulting in a profit after Federal income taxes of $19,578; this compares with a profit of $1,854 for the previous year.

3,892,760

WHITE PINE COPPER COMPANY

Mine

During 1956, the first complete year of operations, the mine produced a total of 3,892,760 tons of ore. This compares with 2,971,900 tons of ore in 1955 when a portion of the year was spent driving development extensions and opening up working territories preparatory to full scale production.

As ore was taken from the mine the working faces became farther and farther away from the underground crusher station. In order to alleviate the burden of long haul on trucks and personnel, lateral belts were designed and purchased during the year. These belts are in the process of being installed, and it is estimated they will be ready for use in April of 1957. Additional lateral belt extensions will be installed later in 1957 and as subsequently required.

The total mine force has remained at about 640 throughout the year. The labor turnover, however, has necessitated continuing job training programs.

Research in mine methods and machines, together with geological interpretation, have indicated necessary changes to mining plans which have and will continue to be made as geological structural conditions dictate these needs.

Mill

In 1956 the mill continued to operate on a twenty-four-hour, seven-day-week basis. A total of 3,965,459 dry tons of ore was milled for a total of 128,439 dry tons of concentrate containing approximately 31% copper.

Modifications were made in the flotation and metallurgy practice to effect a more constant operation and to improve mill recovery.

At December 31, 1956, two rod mills were in the process of installation and were completed in January, 1957. These rod mills increase our grinding capacity and it is estimated will increase the daily rated mill capacity by approximately 16%.

Operations of tailings disposal included an additional lift of ten feet to our present dam bringing the dam to its final elevation. This required the hauling of approximately 746,850 cubic yards of fill. Survey and testing for an extension of our present dam were largely completed during the year. Access roads have been run and a start made on the clearing of the area selected. This additional dam will have sufficient capacity to carry the operation through 1960.

Smelter

During 1956 the smelter at White Pine produced 73,260,163 pounds of refined copper in the form of ingot bars and cakes. An additional 2,256,149 pounds of returnable copper was shipped in the form of concentrates to outside smelters for smelting and refining. These concentrates represented principally the mill production in excess of storage capacity during a scheduled shutdown for major repair and modification of the reverberatory furnace. The modification included addition of water jackets to our furnaces.

73,260,163
2,256,149
4,337,965
571,935
80,426,212

The use of soda ash for arsenic removal in refining has improved the quality of our copper to meet low resistance Lake Copper specifications. Vertical casting of cakes weighing 600, 700, and 800 pounds was started during the middle of the year and 10,587,656 pounds were produced by year end. In October, 1956, 2,000-pound cakes were also produced and by the end of 1956, 2,358,148 pounds of these cakes had been produced.

We are conducting tests of copper content of the dusts in our stack gasses to improve recovery therefrom.

Power Plant

The power station operated continuously for the entire year without power interruptions or unscheduled outage of equipment. The total station output for the year was 143,637,000 K.W.H., of which 568,000 K.W.H. was delivered to the Upper Peninsula Power Company, leaving 143,069,000 K.W.H. to be utilized by the mine site operations.

The increase in load did not require operating all three units at the same time. Normal operating conditions required operating one direct fired unit with the waste heat unit.

Plant Site

Operations of our facilities including water supply, sewerage, surface maintenance, and material handling were conducted to satisfy the daily demands of all production departments and Town Site during 1956.

Our pumping station supplied 18,000,000 gallons of water per day, which was adequate for the operations of the Plant and Town Site. Our utilities are ample to provide for additional contemplated expansion.

Town Site

There are 217 families with a population of approximately 800 now living at the Town Site. Many employees not living at our Town Site have made requests for living quarters within the Town Site area. During the year we rehabilitated some of our older houses and are continuing with this program. We are also converting an additional dormitory into small apartments. At the year-end the Town Site consisted of 184 dwelling houses, 42 apartments, 1 dormitory, a restaurant, shopping center, small hotel, and a hospital. In our Town Site there are also located 2 churches, and an 8-room elementary school leased by us to the Carp Lake Township School District.

Personnel

On October 17, 1956, David R. Straub joined the organization as Vice President, General Manager and Director of White Pine Copper Company. Mr. Straub is a graduate of the University of California and was Project Manager at White Pine Copper Company for the Western-Knapp Engineering Company, the company responsible for the design and layout of our Mine, Mill and Smelter. Mr. Straub is well acquainted with the major operations at White Pine.

On November 1, 1956, J. V. O'Connor was appointed Sales Manager for our White Pine and Champion Mine copper production. He was formerly associated with the C. G. Hussey & Company Division in Pittsburgh.

William P. Nicholls, a Vice President, associated with Copper Range Company for 21 years, was elected a member of the Board of White Pine Copper Company on December 12, 1956.

On December 31, 1956, our labor contract was open for discussion of uniform hourly rates of pay; a settlement was reached, without loss of time, satisfactory to both labor and management. A friendly feeling exists between labor and management.

COPPER RANGE COMPANY AND

Consolidated Balance Sheets as at

ASSETS

	[redacted]	1955
Current assets		
Cash	[redacted]	$ 4,667,515
U. S. Government securities, at cost	[redacted]	17,007,844
Accounts and notes receivable, less reserve	[redacted]	4,817,221
Inventories (Note 2)		
Copper and brass	[redacted]	3,888,934
Supplies	[redacted]	1,619,078
Prepaid expenses	[redacted]	231,210
Total current assets	[redacted]	32,231,802
Investments		
Copper Range Railroad Company and others (Note 3)	[redacted]	1,055,252
Plant and properties (Note 4)		
Mines, lands, mine development, mineral rights and timber tracts (Note 5)	[redacted]	10,495,398
Buildings, machinery and equipment	[redacted]	68,983,836
	[redacted]	79,479,234
Less Accumulated depreciation	[redacted]	9,501,968
	[redacted]	69,977,266
Other assets		
Mortgage notes receivable assigned to Reconstruction Finance Corporation	[redacted]	346,856
Cash restricted for construction under Reconstruction Finance Corporation mortgages	[redacted]	81,737
Recoverable portion of federal income taxes of prior years	[redacted]	119,000
Deferred expenses	[redacted]	145,703
	[redacted]	$103,957,616

(See notes to financial statements on pages 18-19)

WHOLLY OWNED SUBSIDIARIES

December 31, 1956 and 1955

LIABILITIES AND STOCKHOLDERS' EQUITY

	[redacted]	1955
Current liabilities		
Accounts payable	[redacted]	$ 1,187,760
Federal income taxes (Note 6)	[redacted]	2,398,893
Accrued wages, state and local taxes and other expenses	[redacted]	908,884
Payment due within one year on mortgages payable to Reconstruction Finance Corporation (Note 7)	[redacted]	1,250,000
Total current liabilities	[redacted]	5,745,537
Mortgages payable to Reconstruction Finance Corporation, due after one year (Note 7)	[redacted]	57,850,876
Stockholders' Equity		
Capital stock, $5 par value (Note 8)		
Authorized 3,000,000 shares		
Issued — 1956, 1,875,420 shares; 1955, 1,778,534 shares	[redacted]	8,892,670
Capital surplus	[redacted]	17,025,230
Earned surplus (Notes 7 and 9)	[redacted]	14,443,303
	[redacted]	40,361,203
	[redacted]	$103,957,616

(See notes to financial statements on pages 18-19)

COPPER RANGE COMPANY
AND WHOLLY OWNED SUBSIDIARIES

Consolidated Income Statements
For the Years ended December 31, 1956 and 1955

	[redacted]	**1955**
Income		
Sales of copper and copper products	[redacted]	$47,736,518
Interest earned	[redacted]	156,204
Royalty from Douglass lease	[redacted]	59,340
Sales of timber, land rentals, etc., net	[redacted]	92,566
	[redacted]	48,044,628
Expenses		
Cost of sales and other charges excluding items separately listed below (Notes 2 and 5)	[redacted]	28,049,898
Provision for depreciation	[redacted]	3,141,934
Selling and administrative expenses	[redacted]	3,180,571
Loss on sale or abandonment of plant assets	[redacted]	281,518
Interest paid	[redacted]	2,150,648
	[redacted]	36,804,569
Income before federal income taxes	[redacted]	11,240,059
Provision for federal income taxes (after deducting in 1956 prior years' adjustments, net, of $275,000) (Note 6)	[redacted]	2,200,000
Net income for year, without deduction for depletion — to earned surplus (Notes 5, 6 and 7)	[redacted]	$ 9,040,059

(See notes to financial statements on pages 18-19)

COPPER RANGE COMPANY
AND WHOLLY OWNED SUBSIDIARIES

Consolidated Capital Surplus Statements
For the Years ended December 31, 1956 and 1955

	[redacted]	1955
Balance at beginning of year	[redacted]	$ 1,997,948
Transfer from capital stock account on reclassification of shares from no par to $5 par	[redacted]	3,671,272
Excess over par of 282,464 shares issued during the year, less expense	[redacted]	8,201,243
Excess of market value over par value of shares distributed as stock dividend	[redacted]	3,154,767
Excess of purchase price over par of 9,450 shares issued during year under restricted stock option plan	[redacted]	—
Balance at end of year	[redacted]	$17,025,230

Consolidated Earned Surplus Statements
For the Years ended December 31, 1956 and 1955

	[redacted]	1955
Balance at beginning of year	[redacted]	$ 9,649,584
Net income for year without deduction for depletion (Notes 5, 6 and 7)	[redacted]	9,040,059
	[redacted]	18,689,643
Dividends declared and paid		
In cash	[redacted]	621,419
In stock, including cash paid for fractional shares	[redacted]	3,624,921
	[redacted]	4,246,340
Balance at end of year (Notes 7 and 9)	[redacted]	$14,443,303

(See notes to financial statements on pages 18-19)

3670
91
3879

SV

NOTES TO FINANCIAL STATEMENTS

NOTE 1. Accounts of Copper Range Company have been consolidated with those of its wholly owned subsidiaries, as follows: White Pine Copper Company, Copper Range Motor Bus Company (inactive since April 15, 1955 and liquidated December 31, 1956) and three inactive companies. Consolidated income statements include White Pine Copper Company since start of operations, February 28, 1955.

NOTE 2. Metal contents of inventories of fabricating division are stated at cost on basis of last-in first-out inventory method (adopted January 1, 1946), which was below market as at December 31, 1956; labor and burden costs of such inventories are based on average current costs for year. All other inventories are stated at lower of cost or market on basis of first-in first-out inventory method.

NOTE 3. Investment of Copper Range Company in capital stock of Copper Range Railroad Company, $1,052,708, represents 8,034 shares of 5% non-cumulative preferred stock at cost, $623,616, and 15,704 shares of common stock, $429,092, of which 1,441½ shares are carried at cost and remaining 14,262½ shares are carried at $30 a share as determined by directors in 1931. Values at which shares of Copper Range Railroad Company are carried on books of Copper Range Company do not represent current realizable value.

Equity of Copper Range Company in net assets of Copper Range Railroad Company (not consolidated in these statements) was $2,902,041 at December 31, 1956. Equity in net income of that company for year ended December 31, 1956 amounted to $16,097.

Investments in other companies amounted to $2,544.

NOTE 4. Plant and properties consist of:

	Assets	*Accumulated Depreciation*	*Net Balances*
Copper Range Company			
Mining division, as valued by directors as at December 31, 1931, plus additions at cost	$ 7,100,567	3,957,658	3,142,909
Fabricating division, at book values of predecessor corporation, plus additions at cost	3,117,856	1,595,172	1,522,683
White Pine Copper Company, at cost	70,864,905	7,590,886	63,274,020
Totals — December 31, 1956	$81,083,328	13,143,716	67,939,612

NOTE 5. During 1956, except for depletion of timber lands for sales of timber, no depletion was recorded on books or included in expenses in financial statements. Values at which properties are carried on books do not represent current realizable values.

NOTE 6. Federal income tax liability, $3,374,801, shown on balance sheet represents liability for 1956 tax, and estimated taxes payable for prior years. In computing 1956 provision for federal income taxes, company has deducted percentage depletion and accelerated amortization under necessity certificate on certain White Pine Copper Company assets. These deductions, which are not recorded on books, resulted in tax reduction of $3,570,000. In 1955 similar deductions, together with other allowable deductions not charged to expense on books, resulted in tax reduction of $3,850,000.

NOTES TO FINANCIAL STATEMENTS

NOTE 7. During 1956 White Pine Copper Company 5% mortgage loans on White Pine property were reduced $7,504,602 leaving unpaid balance of $51,596,274. Fixed instalments due in 1957 and 1958 and estimated contingent amounts due in 1957 have been prepaid. Accordingly, no fixed and contingent amounts are due in 1957. Remaining fixed payments are due beginning January 1, 1959 at $3,400,000 a year, in quarterly instalments of $850,000. Additional amounts payable, based on tax savings, if any, due to accelerated amortization and on White Pine earnings as defined in loan documents, are to be applied in inverse order of maturity. Amounts so payable for 1956 — $1,760,000 and $386,000, respectively — were prepaid in 1956.

Dividends may not be paid by White Pine Copper Company without approval of Reconstruction Finance Corporation.

NOTE 8. During 1953 stockholders approved restricted stock option plan under which options to purchase not more than 76,703 shares of common stock (after adjustments for stock split and stock dividends) may be granted to key employees. Option to any one employee may not cover more than 11,025 shares. Purchase price is not to be less than 95% of fair market value at time option is granted. Option may not be exercised after ten years from date option is granted.

Options are exercisable for amounts up to 6,062 shares after March 1, 1957 at $23.92 a share, for an additional 4,410 shares after September 1, 1957 at $33.61 a share and for an additional 4,200 shares in lots up to 1,050 shares on October 17, 1957, 1958, 1960 and 1962 at $42.98 a share.

Stock option transactions during the year were as follows:

	Shares	*Option Price*	*Fair Market Value at Date of Grant*
Shares issuable under outstanding options at December 31, 1955	25,697	$ 523,825	$ 551,250
Options granted during year	4,200	180,500	190,000
Options exercised during year	(9,450)	(85,500)	(90,000)#
Options cancelled during year	(5,775)	(145,062)	(152,625)
Shares issuable under outstanding options at December 31, 1956	14,672	$ 473,763	$ 498,625

#Fair market value at date exercised, $453,600.

At December 31, 1956 there were 52,581 shares available for issuance under option plan as compared with 51,006 at December 31, 1955. No charge against income on account of granting of options has been made.

NOTE 9. Unfunded past service costs (not recorded on books) of retirement plan for certain employees of fabricating division, effective October 7, 1955 under terms of union contract, amounted to $362,750 (as estimated by company's actuaries), of which $40,185 was paid during 1956. Until all past service has been provided for, annual cost of plan (including payment for normal cost) is estimated to be approximately $62,700. This plan is in addition to the one effective January 1, 1948 covering salaried employees, the past service cost of which will be funded by December 31, 1957.

REPORT OF INDEPENDENT PUBLIC ACCOUNTANTS

SCOVELL, WELLINGTON & COMPANY

Accountants and Auditors

Boston, February 28, 1957

To the Board of Directors of
Copper Range Company

We have examined the consolidated balance sheets of Copper Range Company and its wholly owned subsidiaries as at December 31, 1956 and 1955, and the related consolidated statements of income and surplus for the years then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

The practice of the company in computing consolidated net income without deduction for depletion of metal mines is in accordance with accepted accounting procedures in the copper-mining industry, and is in agreement with long established and consistently maintained accounting practices of the company and others similarly situated.

In our opinion, the accompanying consolidated balance sheets and consolidated statements of income and surplus, and the notes thereto, present fairly the financial position of Copper Range Company and its wholly owned subsidiaries at December 31, 1956 and 1955, and the results of their operations for the years then ended, in conformity with generally accepted accounting principles applied each year on a basis consistent with that of the preceding year.

Scovell, Wellington & Company

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COPPER RANGE COMPANY ANNUAL REPORT 1968

COPPER RANGE COMPANY
and Subsidiaries

SIXTY-EIGHTH ANNUAL REPORT
for the year ended December 31, 1968

CONTENTS

RESULTS AT A GLANCE
(Consolidated Basis)

	1968	1967
Net sales	$ 81,046,605	$ 60,840,035
Income before federal income taxes	$ 12,356,016	$ 1,114,665
Provision for federal income taxes	$ 2,650,000	$ 500,000
Net income	$ 9,706,016	$ 614,665
Net income per share*	$ 4.59	$ .29
Dividends:		
Paid in cash, $.50 per share	$ 1,028,295	$ 1,025,393
Paid in stock	3%	—
Capital expenditures	$ 14,416,405	$ 18,074,371
Depreciation and, in 1968, depletion	$ 5,601,480	$ 6,184,043
Research and exploration expenses	$ 3,229,156	$ 2,480,225
Cash, including certificates of deposit	$ 7,305,374	$ 10,189,481
Net working capital	$ 18,018,645	$ 18,664,070
Working capital ratio	2.3 : 1	3.2 : 1
Long-term debt:		
Current portion	$ 4,012,500	$ 2,137,500
Due after one year	$ 33,400,000	$ 35,412,500
Shareholders' equity	$ 84,641,250	$ 75,962,056
Book value, per share*	$ 39.97	$ 36.00
Ore mined (tons)	7,515,820	5,104,588
Copper produced (pounds)	147,604,119	101,568,460
Shares outstanding at year end	2,117,804	2,054,668
Approximate number of shareholders	3,803	3,633
Number of employees	3,219	2,943

*Based on average shares of stock outstanding of 2,116,578 in 1968 and 2,109,937 in 1967 after adjustment for 3% stock dividend paid in December, 1968.

To Our Shareholders:

The year 1968 marked a return to the upward trend in earnings which has been characteristic of recent years. Because of the long, devastating strike, which lasted for four months in 1967 and continued for one month in 1968, a comparison of figures for these two years has little meaning. Of real meaning, however, is the fact that total refined copper production, earnings, earnings per share, funds generated, and book value achieved record figures during 1968. These levels were attained despite a continuation of the strike at the mine through January and a three-month strike at the fabricating facilities at Leetsdale.

These record achievements resulted from the completion or near completion of physical facilities involved in expanding all major activities of your company. Full utilization of facilities, however, can rarely be achieved immediately upon completion. The staff has to be recruited and trained to use the facilities at maximum efficiency.

At year end none of the major facilities, either at the mine, the Anderson plant of the Hussey Metals Division, or the new wood-products plant at South Range, Michigan, were fully manned with completely trained operators. The 147-million-pound production from White Pine was achieved in eleven months, but the anticipated production rate of 172 million pounds per year was not attained. The larger machines at the Anderson plant, although installed, were not fully tuned, so this plant contributed very little to the earnings of Hussey during 1968. Its contribution is expected to increase throughout 1969. Construction of the new forest-products plant in South Range was authorized only in May of 1968, yet preliminary operations actually began in December. All equipment now is installed, and sales outlets are established. The earnings of this facility should be increasing steadily as the crews become more expert and more of its products are marketed.

Thus, we have been able to demonstrate our ability to reach for and attain high levels of productivity and earnings, and are encouraged to strive for the even higher levels which are justified by the fundamental resources of your company.

FINANCIAL CONDITION

Profits rose from $614,665, or 29 cents a share, to $9,706,016, or $4.59 a share — not only as the result of a year with far more working days but also because of higher production levels and higher prices. This $4.59 per share figure included 40 cents per share resulting from the accounting changes described in the Notes to Financial Statements. The majority of profits was provided by White Pine. The Leetsdale plant of the Hussey Metals Division was shut down by a strike for three months, and it took several months to recover from its effect. In order to complete the capital expenditures required for the expansion of facilities, working capital was drawn down by $645,000, while reducing the total debt to the banks and insurance companies by only $137,500. With our available bank credit remaining at $10 million, it is obvious that our financial condition is strong and satisfactory for planning additional expansion.

The Board of Directors continued the dividend policy initiated in 1965 by declaring a 50-cent cash dividend and, in addition, a three per cent stock dividend in December. The cash dividend was held at this low figure in line with the Board's continued policy of conserving cash for capital expenditures required to develop and improve company properties. This program was continued by the declaration of another 12½-cent cash dividend in January, 1969, payable on March 3, 1969.

Retained Earnings — The success of this policy is demonstrated by the historical tables on pages 18 and 19. Over the past eight years, with a decrease in long-term debt, the company's mining and refining capacity for copper has been increased by more than 30 per cent. Fabricating facilities have been modernized and capacity almost doubled; a new forest-products plant has been activated; and ore reserves have been materially increased.

Also, not revealed in these figures is the extensive program the company has maintained over the past eight years in research and in exploration for new deposits. We have reported these expenditures for the current years in the tabulations appearing on page 2. Just as the costs for scientific work in the search for new products and processes are permitted to be expensed under the tax laws, so under tax laws as now amended the search for ore deposits is treated as the research it is and may be deducted as a cost of doing business. Viewing the future growth of this company and its contribution to the economy as a whole, research expenditures are truly in the nature of investments. The $3.2 million spent on research and exploration during 1968, and similar amounts spent in previous years, have resulted in discovery of new ore reserves, which assure the continuation of your company's operations into the far distant future, and also in cost-reducing processes. Research also has been engaged in finding new products upon which your company can expand its activities.

WHITE PINE

Mining Methods — The ore reserves established by geological exploration have made available to the company one of the world's largest known copper resources. The greatest portion of this deposit, however, cannot be mined by standard methods and those which we currently are using. To develop the full potential of this vast orebody, large sums have been expended on research into new processes for breaking and transporting the copper-bearing rock, as well as for developing the machines to carry out these processes.

As operations penetrate deeper into the earth, it has become apparent that more sophisticated mining methods are needed to produce the same or larger quantities of copper at comparable costs and therefore profits. In the 1964 annual report our current mining method, known as the room-and-pillar method, was described. As operations go deeper, these supporting pillars must become larger, and consequently cause a decline in the efficiency of operations. To overcome this problem, two approaches are being taken: The first is to modify the room-and-pillar method, through a system of pillar robbing and caving; the second is the development of the longwall mining method (also described in the 1964 report), which has now been tested successfully in two places in the mine. The latter method was originally designed for mining soft rocks, such as coal, with a relatively shallow cover, and has rarely required blasting against the mechanical roof supports which have to be used in the system. We now have devised and tested two ways of breaking the rock in a manner that protects the complicated equipment used: One is by conventional blasting methods applied in a different way; the other is by the use of an apparently new rock-breaking procedure which eliminates the use of explosives and takes advantage of the pressure from the overlying rock. Because the pressure increases as the mine gets deeper, the ability to break the rock will improve. The scientific phase of this research, for the most part, has been completed, and detailed engineering of the required hardware is being carried out. Both methods are far along, and it is believed that we will be able to use them ultimately as our principal mining methods. It will, however, take many months of development to design and have built the machines necessary for the purpose, followed by training of personnel and developing the mine to utilize such machines. Several years thereafter will be required to replace old equipment by these machines in routine operations.

In the meantime there are ample ore reserves which can be mined by present methods at our current rate of production, so we need not be fearful that we will run out of ore before we are prepared to mine the more difficult sections of the orebody.

Fortunately, the change in method will not require a complete change of present equipment, as some observers fear. The mining equipment used by us is operated under severe conditions and is depreciated in a relatively short time — from four to five years. Normal allowances for depreciation permit the replacement of this equipment on a planned basis; therefore, when it becomes essential to install new equipment in the mine, a large part of it will be in lieu of normal replacement.

Development — Three years ago a shaft was started that would be 1,600 feet deep and located five miles from the present portal. This (the No. 3) shaft was intended to give us access to ore reserves distant from our present facilities. It now has been completed and equipped with hoists and service facilities. Extensive openings still have to be mined from which eventual ore production can take place. The 18-foot boring machine, described in our last annual report, currently is engaged in connecting this shaft with the main workings, and we expect it will do so in the middle of 1969. The geological conditions that confronted us two years ago resulted in development work falling behind schedule. Consequently, it has not been possible until recent months to move producing units from one area to another and still have a place to mine the ore. During the last quarter of 1968, development work began to catch up and is sufficiently far ahead now to provide some leeway in placing producing units. Nevertheless, it will take two or three years to obtain a satisfactory margin of developed workings ahead of the producing units. This condition will improve materially when the boring machine connects the No. 3 shaft with the main workings and development from the bottom of the shaft becomes well established to the north and west. As of

March 1, 1969, the boring machine was proceeding at the expected rate and had advanced 310 feet in its tunnel.

As a part of developing new mining methods, the boring machine is tunnelling below the ore horizon in the underlying sandstone. This will make it easier to maintain communication, transportation, and ventilation systems beneath areas that are to be mined and eventually caved. Although no copper is produced as a tunnel is bored beneath the orebody, the savings in future efficiencies are well worth the deferred profits. The development work now going forward is in preparation for the eventual use of new mining methods. These are expected to help increase copper production capacity from the present 172 million pounds to approximately 200 million pounds a year with only nominal additions to milling and smelting facilities. This will be accomplished, in large measure, by increasing the grade of ore through mining methods, rather than by reaching for higher grade ore reserves. In other words if the grade of ore going to the mill can be improved, more copper will be recovered by the mill circuit going into the smelter than is the case at present. Experience with the new rate of development and the new mining methods is necessary before committing ourselves to the next expansion step — a goal in excess of 300 million pounds per year.

Transition — Thus, 1968 at White Pine was the beginning of a recognized transition period from a well-established room-and-pillar mining operation to a low-headroom "values only" system. It was a year involved in researching new mining methods, rock-breaking procedures, and equipment. In 1968 plans were made and a schedule developed to phase out the present room-and-pillar mining system into a values-only method within a period of five to six years. These plans include replacing equipment used in previous methods with devices specially designed for use in low-headroom openings, without sacrificing unused life of the older facilities.

The transition to the kind of mining method which can be used more effectively as the mine gets deeper involves protecting the haulage and ventilation ways and allowing the rocks in mined-out areas to cave on a carefully controlled basis. In the past few years we have used different procedures leading towards the caving of mined-out areas after the recovery of as much ore as possible. Two of these have been devoted to developing the longwall mining method, and in both it was possible to prove by careful scientific analysis, engineering, and actual experience that the rocks can indeed be made to respond to the longwall procedure. Insofar as the behavior of the rocks is concerned, this now is considered to be satisfactorily determined.

In other places we have gone through the mine with one pass, confining the mining operations to one of the two layers of ore, and removing the pillars on a systematic basis. The roof then is permitted to cave behind the retreat without endangering the men and workings. This permits recovery of more than 85 per cent of the ore. This method has proved satisfactory — conserving resources by robbing pillars and abandoning an area permanently without damage to future mining operations.

Production — Despite the fact that the strike continued well into January, 1968, White Pine produced a record 147,071,163 pounds of refined copper during 1968. Production at the mining faces was somewhat more efficient than last year. A large part of the mining effort, however, had to be devoted to advance development, personnel training, research, and opening the No. 3 shaft. An increase in costs resulted from higher wage rates and an almost 10 per cent rise in prices of materials and supplies. In net, however, savings resulting from new equipment, improved management, and individual efforts of hourly employees were overshadowed by these cost increases.

Geology — Long-range development planning at the mine is intimately related to geology as well as an understanding of strengths and weaknesses of the rocks involved. Therefore, the long-range planning and rock-mechanics activities of the Research Department were transferred to the Geology Department during the year. Continuous drilling in the orebody has made it possible for geologists to be more precise than ever in predicting the nature and structure of the ore to be encountered as progress is made. White Pine requires the closest possible attention of a sophisticated geological staff, in planning and in day-to-day operations where geology is fully integrated into routine procedures. This planning and extended geological work have increased our knowledge of ore reserves within reach of present mining facilities and at shallower depths where mining conditions are well understood.

Ore Reserves — The presently known ore reserves, as determined by drilling, are ample to maintain operations for many years to come — both with present mining methods and those under development. Therefore, geological work during 1968 was confined mainly to obtaining accurate information for designation of the ore reserves to be mined in the near future. Ore reserves will not be a problem to this mine for many years — merely the technology to take the greatest advantage of those that are presently known. On the map on page 7 the White Pine and Southwest Orebodies are shaded in orange. The shading fades out to the north of the "mined-out area," indicating that the ore reserves extend an undetermined distance north of the shaded limit — probably beyond the shore of Lake Superior. Geological knowledge indicates there is ample undiscovered ore for future development within the company's land holdings.

New Shaft — The map of the White Pine mine appearing on the following page includes areas to be mined in the future. The map shows the location of the No. 3 shaft, completed and equipped in 1968, and the development work to connect it with the main workings to the west. The arrow indicates the position of the 18-foot boring machine which was described in the last annual report. Experience with this machine indicates that it can achieve the rate of development expected, so that this bore hole should connect with the main workings and provide a new access to them, plus a means of ventilation, sometime in mid-1969. The map indicates that workings to the west of the shaft have not yet approached the orebody. By the first quarter of 1970 it should be possible to begin hoisting ore up the shaft and transporting it to the mill by means of the Dashaveyor. This novel materials-handling system will be operating during 1969.

Power — Last year it was reported that two 8.5 megawatt gas turbine generators were purchased to provide peaking capacity beyond the three generators already in the power plant. During 1968 it was found that adding a boiler and an additional 8 megawatt generator to the system enabled us to take advantage of waste heat from the gas turbines, thereby rendering the total unit as efficient as the steam turbines now in existence. The boiler and generator were purchased in 1968, and will be installed sometime in 1969. Modernization of the mine requires greater quantities of electricity; consequently, during the year assurances were received from the Upper Peninsula Power Company that growing requirements will be met from new capacity the utility is building and from interconnecting tie lines with other power companies.

RESEARCH

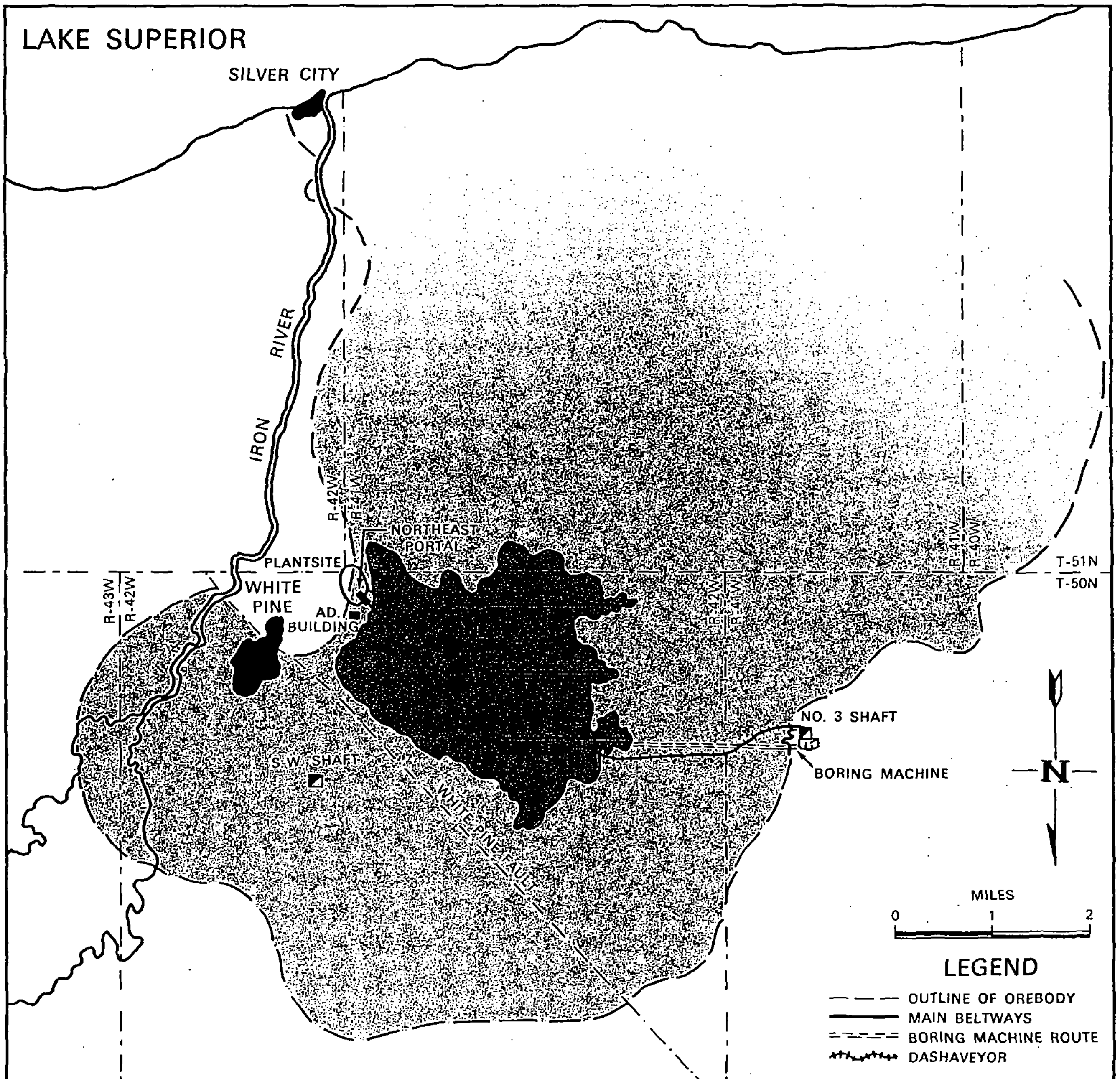
New mining methods, improved mining procedures, and increased recoveries from the mill result from years of research. During 1968 the final research was completed on mill circuits to recover surplus silver not needed in processing our Lake Copper. These facilities are recovering silver at a rate slightly under one million ounces a year. This gives us the dual advantage of being able to control the quantity of silver passing through to refined copper and also to obtain a direct return from the sale of silver itself. Our sales with higher silver content receive a premium equivalent to the value of the silver content.

In addition to improvements of mining, milling, and smelting methods at White Pine, the Research Department continues to work with the producing units of the Hussey Metals Division to enhance the quality of our products, find more efficient ways of producing them, and discover means for satisfying the demanding requirements of our customers when they need fabricated metals of different varieties and types. Two new products have resulted from work at Contemporary Research, Inc., our wholly owned research subsidiary, and are undergoing tests.

EXPLORATION

The Exploration Department continues to explore the White Pine area on lands held by the company, in preparation for developing ore for the future. Extensive exploration also has been carried on in the Western States and Western Canada. An agreement with the owners of the old United Verde deposits near Jerome, Arizona was announced last November. Drilling on these claims early in 1969 will test a geological theory that there are additional deposits present which are similar to those mined in past years.

The search for new mineral deposits, although exciting, is frequently frustrating. In the annual report last year, two adjacent deposits in New Mexico were described. Our knowledge indicated that these deposits might well be mined and treated by leaching methods. Engineering work completed during 1968, however, showed that although copper deposits existed in about the size and grade anticipated, mining and recovery costs would be too high to result in a rate of return normally expected from new ventures. The options were therefore released.



SURFACE and SUBSURFACE FEATURES
of the WHITE PINE MINE AREA

FEB. 1, 1969
T-50N

HUSSEY METALS DIVISION

The Hussey Metals Division is comprised of a main plant in Leetsdale, Pennsylvania, satellite finishing plants in Eminence, Kentucky and Anderson, Indiana, and warehouses in New York, Philadelphia, Cleveland, Chicago, Pittsburgh, and Cincinnati. The Leetsdale plant was struck for three months last spring. The impact of this strike was minimized greatly by accelerated operations following the strike, and the unit experienced a decline in sales for the year of only ten per cent. The strike notwithstanding, Hussey's contribution to overall corporate earnings was only slightly less than that of 1967. However, it should be noted that this division's contribution should be three times greater than that presently being achieved. With the modernized facilities at Anderson, which are expected to improve the unit's efficiency and production rate, Hussey Metals Division now should return to its expected rate of contribution to total company earnings.

OPERATIONS IN THE UPPER PENINSULA OF MICHIGAN

Railroad — Closing the Champion mine in 1967 reduced operations of the Copper Range Railroad, which ended the year with a small loss.

Continuance of the railroad enables the company to maintain its rights-of-way, which run for long distances through the core of vast, company-controlled land holdings in the area. If the company were to find and develop other mines in the region, the railroad would be available to service them.

Lands and Forests — Included in these lands are 185,000 acres of forests owned in fee by the company. In the past these forests have been controlled by a competent staff of foresters who replant abandoned farm lands, improve roads within the forests, and sell matured trees through a sustained yield plan. The sale of these trees, however, has not been sufficient to cover administrative costs and land taxes, which continued to rise over the years. It was determined after several years of study that more profitable use could be made of these lands than selling trees on the stump. In May, 1968 the Northern Hardwoods Division was formed, and by the end of the year a new, fully automated, ultramodern plant was virtually completed. These facilities are capable of producing 35,000 board feet of precision-sawn lumber per eight-hour shift. In addition, the sawmill segment can produce materials for flooring, boxes, and paper. It also will serve wood-using industries in the region. A large building was constructed, which contains drying rooms, kilns, and machinery for producing precisely cut wooden pieces required by furniture and television manufacturers, and others. All facilities are now in operation.

The sawmill already has begun to sell its products, and especially encouraging is the magnitude of the market for northern poplar. This tree has been considered a weed tree, for it was the first to return to growth after old lumbering methods had cleared an area. Because we are able to market these poplars, we will be able to better control the growth of maple, the most profitable product.

The plant, designed as a two-shift operation, will use all the sustained tree growth on company lands. Should markets expand as expected, it will be possible to make arrangements with neighboring landowners to harvest their trees and market their products along with ours, with only minor additions to the plant. During construction of the facility, sales of trees were reduced in order to build inventories to service the plant in the future. This division, therefore, showed a small loss during 1968. Because inventory building and training will consume several months into 1969, it will be the latter part of the year before the operation begins to contribute to earnings. Its contribution for the present will be relatively small in comparison to earnings of the mining division; nevertheless, in turning a loss into a profit, the net result will be a significant contribution to future overall earnings. Furthermore, return on available resources is being maximized, and forecasts indicate this division will become increasingly important.

Machine Shops — Machine shops at Painesdale, Michigan, formerly serviced the Champion mine. As Champion's operations declined, more of the shops' facilities were utilized to do special jobs for which those at White Pine were not equipped. A competent mechanical engineer was installed in charge of this operation. It is now supplementing the work for White Pine by servicing contractors and other plants in the vicinity. With a reservoir of fine people in the area, this now relatively small operation can very well grow large enough to make a contribution to the company.

ACQUISITION

In 1968 Copper Range Company acquired a 50 per cent interest in the Tubex Corporation, of Chicago. This company, with its technical know-how, has developed specialized equipment and will produce welded tube from flat-rolled strip in a variety of metals.

MARKETS

The turmoil of the past five years was not alleviated by the domestic copper industry's return to full production in March. Much of the previous distortion resulted from attempts by governments to interfere with the copper markets. The aim of some countries to increase the price came into head-on conflict with this nation's desire to hold it at an artificially low level. The eight-month strike almost completely eliminated traditional sources of supply to the U. S. copper-consuming community. This caused a natural movement of U. S. copper buyers to distant sources and thereby created temporary changes in buying patterns.

The long strike depleted inventories of prime metal throughout the Free World. With a return in 1968 to high levels of consumption, and with less substitution than expected, the real market value of copper probably is undergoing an upward revision to a level not yet accurately determined.

When your company resumed production of primary copper in January, 1968 (two months ahead of the major producers), an attempt was made to find a formula which would more clearly relate our price of copper to the metal's actual value in world markets. This formula resulted in an average of 50.29 cents during the months of February and March. When the larger producers resumed operations, they returned to the so-called "producer" price, which was established at 42 cents per pound. *This wide disparity reflected adversely* on our customers so we were forced to adopt the producer price of 42 cents on April 1.

For nine months, a constant 42-cent domestic price was exceeded on the Free World primary market by between 5 and 15 cents. It became apparent that the 42-cent price base had no relationship to current attitudes toward copper values. The relationship between the producer price of 42 cents and the world price for copper throughout this period is shown as follows:

1968	World Price	Excess Over 42¢
April	56.94¢	14.94¢
May	49.72	7.72
June	51.54	9.54
July	47.82	5.82
August	47.89	5.89
September	50.36	8.36
October	48.96	6.96
November	48.97	6.97
December	53.74	11.74

A careful study of world markets, involving personal visits to foreign consumers, was conducted in order to ascertain the rate of substitution which may result from higher prices for copper being charged in Europe for so long, and to try to arrive at a figure which would more nearly reflect the facts of market life. As a result, the company increased its price from 42 cents to 45 cents on December 27, 1968, to take effect the first day of the new year. The other producers followed this action but went only to 44 cents as the basic producer price of electrolytic copper. To date, every factor leads us to believe that our original decision was correct, and the company therefore maintained its price of silver-bearing Lake Copper at 45 cents per pound. Every intention also is present to change the price again if the Free World marketplace continues to place as high or a higher value on the metal.

Several factors lead to the above conclusion. The U. S. production in 1968 — about 1.2 million tons — was more than 25 per cent ahead of 1967. This is explained largely by the strike months included in 1967. However, the monthly production rate in 1968 was not more than three per cent ahead of 1966. Much of the promised expansion that should have appeared by this time has yet to materialize. All possible expansion will be needed and welcomed in order to maintain copper's market position. A commodity such as copper cannot continue to maintain an artificial price in the face of strong inflationary forces. Producing copper involves not only large wage increases granted organized labor but, also, the heavily increased prices for materials, supplies and services. These have risen faster than labor. In addition, a most severe inflationary factor during this period has been the cost of construction. In the past the rule-of-thumb

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November	48.97	6.97
December	53.74	11.74

A careful study of world markets, involving personal visits to foreign consumers, was conducted in order to ascertain the rate of substitution which may result from higher prices for copper being charged in Europe for so long, and to try to arrive at a figure which would more nearly reflect the facts of market life. As a result, the company increased its price from 42 cents to 45 cents on December 27, 1968, to take effect the first day of the new year. The other producers followed this action but went only to 44 cents as the basic producer price of electrolytic copper. To date, every factor leads us to believe that our original decision was correct, and the company therefore maintained its price of silver-bearing Lake Copper at 45 cents per pound. Every intention also is present to change the price again if the Free World marketplace continues to place as high or a higher value on the metal.

Several factors lead to the above conclusion. The U. S. production in 1968 — about 1.2 million tons — was more than 25 per cent ahead of 1967. This is explained largely by the strike months included in 1967. However, the monthly production rate in 1968 was not more than three per cent ahead of 1966. Much of the promised expansion that should have appeared by this time has yet to materialize. All possible expansion will be needed and welcomed in order to maintain copper's market position. A commodity such as copper cannot continue to maintain an artificial price in the face of strong inflationary forces. Producing copper involves not only large wage increases granted organized labor but, also, the heavily increased prices for materials, supplies and services. These have risen faster than labor. In addition, a most severe inflationary factor during this period has been the cost of construction. In the past the rule-of-thumb measure of the cost for copper-producing facilities was \$5,000 per ton of ore processed per day. Since building the original plant in the mid-1950's, this figure has increased to almost \$6,500 — a 30 per cent increase. The copper industry, in order to serve its purpose within the world economies, must be continually increasing its capacity and replacing depleted mines. To attract the capital necessary to accomplish this purpose, the industry must be sufficiently profitable. An artificially low price for such a commodity as copper is therefore indirectly an inflationary factor in the economy by restricting the creation of new producing units needed to balance the demand.

The company's end-use marketing program is developing new applications for products made from silver-copper. This program has been enhanced by the publication last December of a new book on our unique metal. It contains 355 pages of technical and historical information, diagrams, and photographs. Prepared by Dr. Walter L. Finlay, our Director of Research, the volume has been received enthusiastically by industry and educators. An exhibit showing current and potential end-use applications of silver-copper, made its debut at a metal exposition last October. It is scheduled for five appearances during 1969. This marketing tool brings our technical people and our special metal face to face with engineers, planners, and those who determine metal specifications.

Members of our staff participated in research, development, and marketing activities of the International Copper Research Association and the Copper Development Association. These organizations are expanding in scope and effectiveness. Plans by the Copper Development Association for advertising and broad communications programs will acquaint industry and the public with more positive aspects of copper metals.

PERSONNEL

Chester O. Ensign, Jr. was elected Vice President — Exploration at the May, 1968 meeting of the Board of Directors, and to the position of Executive Vice President in February, 1969. Mr. Ensign is now in charge of all production activities of the company, including exploration, and the use of geology at the operating properties.

John M. Haivala was elected Executive Vice President and General Manager of White Pine Copper Company upon the resignation of Richard C. Cole last March.

Harry W. Banbury, formerly Assistant Comptroller of White Pine Copper Company, was promoted to Comptroller and Director of Administrative Services upon the resignation of Richard S. Bear. Also at White Pine, David R. Mukavitz was promoted to Smelter Superintendent following the resignation of David J. Buckwalter.

Charles H. Kaefer, who for two years served as corporate Manager of Planning, was promoted to the newly created position of Vice President of Production at Hussey Metals Division and returned to Leetsdale. Robert H. Stoiber was promoted from his position of Manager of Planning, at Hussey, to the corporate Manager of Planning located in New York.

In support of our expansion activities in the Upper Peninsula, we engaged Donald J. French as Production Manager, heading our wood-processing operations; Peter B. Koskela as Superintendent to direct the operations of the shops; and Raymond J. Franz as Comptroller.

LABOR RELATIONS

As 1968 dawned Copper Range employees at the White Pine operation were participating in the longest industry-wide strike of copper's turbulent labor history. Intensive negotiations with the United Steelworkers of America during January, coupled with what apparently was a real desire on the part of our employees to terminate their participation in the strike, led to a settlement on January 25, 1968. This settlement, although costly in comparison to our past settlements, came some two months before other copper companies had reached the first agreements with their employees. The White Pine strike, however, was a prelude to the later strike which developed on March 7, 1968 at our Hussey plant in Leetsdale, Pennsylvania. The Hussey management, for four months prior to this date, had been negotiating with the local union committee. There was little accomplished during these preliminary meetings. It appeared necessary that the company negotiators await the development of patterns outside of their control. Final settlement was reached on June 7, 1968.

Our labor contract with United Steelworkers of America, representing White Pine's employee group, provides for a termination date of July 31, 1971. The contract reached with the directly affiliated local union No. 22705, AFL-CIO, representing Leetsdale employees, provides for a termination date of March 6, 1972. Thus, we are fairly well assured of contract stability for a considerable period of time.

A group of employees at the Anderson plant of the Hussey Metals Division petitioned the National Labor Relations Board for an election to certify the United Auto Workers as their representative. This election was held on September 6, 1968 and the employees voted for "no union."

During this period of relative labor stability and peace, the management of Copper Range has an opportunity to improve its techniques of training supervisory personnel and to develop improvements in the area of interplant communications. It is our hope that our supervisory force, particularly our front-line foremen, will be able to relate directly the well-being of all employees with that of the company. The relationship of White Pine's corporate health to that of the Upper Peninsula of Michigan is easily recognized. Perhaps more difficult to recognize, however, is the significance of the individual employee and his role in the face of growing inflationary pressures. The problem of work stoppages must be solved; its solution calls for constructive efforts of all employees. Failure to eliminate this multi-million-dollar problem can lay waste to corporate growth plans.

The contract with workers of our Painesdale shops expired on September 30, 1967, at which time their principal customer, White Pine Copper Company, was on strike. All mechanics consequently were laid off and no effort made to negotiate a contract. When a final settlement evolved at White Pine Copper Company, the Painesdale shops returned to work with negotiations continuing in their behalf. A contract later was signed on June 14, 1968, which has an expiration date of September 30, 1971.

1969

With the first step of planned expansion in all activities of your company virtually completed at the end of 1968, the year 1969 should be one in which measure is taken of the results of all this research, planning, and construction. For at least two years the company can expect to operate without interruption from labor contract expiration. There is nothing apparent in the economic horizon to seriously threaten those markets which we have carefully built through close customer relations and extensive research and development. Much of the detailed research we have been doing for the past few years with mining and new product investigations will be tested during the year. From this testing a better reading will be provided in advancing our productive capacity commensurate with our natural resource base. The mine, the wood-products plant, and the Hussey Metals Division are all now at new capacity levels and in a position to provide increased earnings for several years to come.

For the Board of Directors

James Boyd

February 27, 1969

President

CONSOLIDATED BALANCE SHEETS

December 31, 1968 and 1967

ASSETS

	1968	1967
Current assets		
Cash	$ 6,496,667	$ 5,360,774
Certificates of deposit	808,707	4,828,707
Receivables, less allowance for doubtful accounts	8,219,131	5,987,923
Inventories		
Metals and metal products	7,811,827	4,502,683
Supplies	7,857,978	6,217,620
Prepaid expenses	358,742	356,454
Total current assets	31,553,052	27,254,161
Investments, at cost	1,225,000	25,000
Property, plant and equipment, less accumulated depreciation and depletion	102,127,468	93,559,481
Deferred charges and other assets	1,653,697	1,979,384
	$136,559,217	$122,818,026

The accompanying notes are an integral part of these financial statements.

LIABILITIES

	1968	1967
Current liabilities		
Current portion of long-term debt	$ 4,012,500	$ 2,137,500
Accounts payable	5,375,121	2,901,865
Accrued liabilities	2,837,814	2,486,711
Federal income taxes	1,308,972	1,064,015
Total current liabilities	13,534,407	8,590,091
Long-term debt	33,400,000	35,412,500
Deferred credits and reserves	4,749,421	2,605,258
Minority interest in consolidated subsidiary	234,139	248,121

SHAREHOLDERS' EQUITY

	1968	1967
Capital stock, $5 par value		
Authorized — 3,000,000 shares		
Issued and outstanding 2,117,804 shares, 1968; 2,054,668 shares, 1967	10,589,020	10,273,340
Capital surplus	27,958,014	25,971,167
Earned surplus	46,094,216	39,717,549
	$136,559,217	$122,818,026

CONSOLIDATED STATEMENTS OF INCOME AND EARNED SURPLUS

For the Years Ended December 31, 1968 and 1967

COPPER RANGE COMPANY

and Subsidiaries

CONSOLIDATED INCOME	1968	1967
Sales and other income		
Sales of metals and metal products	$81,046,605	$60,840,035
Interest income	146,816	70,873
Miscellaneous (charges), income, net	(136,472)	173,929
	81,056,949	61,084,837
Costs and expenses		
Cost of sales	50,496,775	43,257,450
Depreciation and, in 1968, depletion	5,601,480	6,184,043
Selling and administrative expenses	7,286,091	6,336,258
Research and exploration expenses	3,229,156	2,480,225
Interest expense	1,998,646	1,402,310
Loss on disposition of plant assets	88,785	309,886
	68,700,933	59,970,172
Income before federal income taxes	12,356,016	1,114,665
Provision for federal income taxes	2,650,000	500,000
Net income	9,706,016	614,665
CONSOLIDATED EARNED SURPLUS		
Balance at beginning of year	39,717,549	40,128,277
	49,423,565	40,742,942
Dividends		
Cash — $.50 per share	(1,028,295)	(1,025,393)
Stock — 3%, including cash paid for fractional shares	(2,301,054)	—
Balance at end of year	$46,094,216	$39,717,549
Net income per average share	$4.59	$.29

The accompanying notes are an integral part of these financial statements.

CONSOLIDATED SUMMARY OF CHANGES IN WORKING CAPITAL

For the Years Ended December 31, 1968 and 1967

COPPER RANGE COMPANY

and Subsidiaries

SOURCE OF FUNDS	1968	1967
From operations		
Net income	$ 9,706,016	$ 614,665
Depreciation and, in 1968, depletion	5,601,480	6,184,043
Net book value of asset disposals	243,033	543,553
Deferred federal income taxes	2,003,472	629,086
	17,554,001	7,971,347
Net change in long-term debt	(2,012,500)	13,012,500
Proceeds from exercise of stock options	66,822	194,591
Other, net	390,952	223,921
	15,999,275	21,402,359
DISPOSITION OF FUNDS		
Capital expenditures	14,416,405	18,074,371
Cash dividends	1,028,295	1,025,393
Investments	1,200,000	—
Long-term advance	—	1,750,000
	16,644,700	20,849,764
(Decrease), increase in working capital	(645,425)	552,595
Working capital at beginning of year	18,664,070	18,111,475
Working capital at end of year	$18,018,645	$18,664,070

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS

Principles of Consolidation

The consolidated financial statements include Copper Range Company and all subsidiaries more than 50% owned.

Inventories

Inventories are valued at the lower of cost or market.

Cost is computed primarily on an average cost basis for all inventories except metal inventories of the fabricating division where the "last-in, first-out" method is used.

Property, Plant and Equipment

	1968	*1967*
Mines, lands, mine development, mineral rights and timber tracts, principally at cost	$ 14,450,979	$ 12,894,592
Buildings, machinery and equipment, at cost		
Mining facilities	113,499,132	107,085,600
Metal fabricating plants	19,273,880	16,917,223
Railroad property and equipment	3,012,160	3,063,367
Other	1,669,162	99,046
Total	151,905,313	140,059,828
Less, accumulated depreciation and, in 1968, depletion $193,908	49,777,845	46,500,347
	$102,127,468	$ 93,559,481
Charges to operations for the year		
Depreciation	$ 5,407,572	$ 6,184,043
Depletion	193,908	—
	$ 5,601,480	$ 6,184,043

Depreciation is computed principally on a straight-line basis over the estimated useful lives of the related assets. In 1968, the Company changed the method of computing depreciation on certain assets acquired subsequent to 1957, for corporate reporting purposes, from the sum-of-the-years digits method to the straight-line method.

In 1968, the Company adopted the policy of providing for depletion of the book amount of mining properties on a unit of production basis over the estimated useful lives of the related properties. Accordingly, depletion in 1968 amounted to $193,908.

The above described changes increased net income for 1968 by approximately $840,000, equal to $.40 per share.

Retirement Plans

The Company and its subsidiaries have several retirement plans covering substantially all of their employees. The Company's policy is to fund retirement costs accrued. The total retirement expense was $1,262,891 and $899,305 for 1968 and 1967, respectively, which includes amortization of past service costs over periods of ten and thirty years. At December 31, 1968, the vested benefits of certain plans exceeded the pension funds and balance sheet accruals by approximately $2,500,000.

Federal Income Taxes

	1968	*1967*
Provision for taxes payable, current year (1967 reduced by net operating loss carry-back of $551,968)	$ 646,528	$(129,086)
Provision for deferred taxes, net	2,003,472	629,086
	$2,650,000	$ 500,000

Provision for federal income taxes for 1968 was reduced by investment tax credits of approximately $550,000.

Long-Term Debt

	1968	*1967*
5% unsecured insurance company loans payable in semi-annual installments of $650,000 beginning June 1, 1970 and final payment of $1,800,000 June 1, 1984	$20,000,000	$20,000,000
6% unsecured bank loan payable semi-annually in ascending amounts from $937,500 in May, 1969 to $2,250,000 in May, 1972	14,062,500	15,000,000
¼ of 1% above prime bank rate, unsecured bank loan payable in semi-annual ascending installments of $250,000 in August, 1971 to $440,000 in February, 1974	2,000,000*	—
4¾% unsecured bank loan payable in semi-annual installments of $600,000	1,200,000	2,400,000
6% unsecured bank loan payable January 15, 1970	150,000	150,000
	37,412,500	37,550,000
Less, amounts payable within one year	4,012,500	2,137,500
Net long-term debt	$33,400,000	$35,412,500

*During 1968, the Company entered into an agreement to borrow up to $12,000,000 on unsecured bank loans and had borrowed $2,000,000 at December 31, 1968. The Company agreed to pay a commitment fee at the rate of ⅜ of 1% per annum on the unused balance.

The related loan agreements contain certain covenants which restrict the payment of cash dividends. At December 31, 1968, $28,270,819 of consolidated earned surplus was free of dividend restrictions, subject to the requirement that the Company maintain working capital of $15,000,000.

Deferred Credits and Reserves

	1968	*1967*
Deferred federal income taxes, net	$4,151,819	$2,148,347
Reserve for deferred compensation	597,602	456,911
	$4,749,421	$2,605,258

Capital Stock and Capital Surplus

Changes in capital stock and capital surplus during 1968 are summarized as follows:

	Capital Stock		*Capital*
	Shares	*Par Value*	*Surplus*
Balance January 1, 1968	2,054,668	$10,273,340	$25,971,167
Exercise of stock options	2,915	14,575	52,247
3% stock dividend	60,221	301,105	1,934,600
Balance December 31, 1968	2,117,804	$10,589,020	$27,958,014

Key Employee Stock Option Plan

The plan provided for the issuance of stock options at a price not less than 95% of the fair market value on options granted prior to 1964 and at 100% thereafter through the termination date, May 1, 1967. At the beginning of 1968, options for the purchase of 28,106 shares were outstanding. During 1968, options for 2,415 shares were cancelled and options for 2,915 shares were exercised at prices ranging from $16.58 to $31.84 per share. At December 31, 1968, options for 23,480 shares were outstanding at prices ranging from $14.11 to $48.12 per share. The options outstanding at December 31, 1968 and the option prices per share have been adjusted to reflect the 3% stock dividend paid in December, 1968.

LYBRAND, ROSS BROS. & MONTGOMERY
CERTIFIED PUBLIC ACCOUNTANTS

COOPERS & LYBRAND
IN AREAS OF THE WORLD
OUTSIDE THE UNITED STATES

To the Board of Directors of
Copper Range Company:

We have examined the consolidated balance sheet of COPPER RANGE COMPANY and SUBSIDIARIES as of December 31, 1968 and the related statement of income and earned surplus and the summary of changes in working capital for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We previously made a similar examination of the financial statements for the year 1967.

In our opinion, the aforementioned financial statements present fairly the consolidated financial position of Copper Range Company and Subsidiaries at December 31, 1968 and 1967 and the results of their operations and the changes in working capital for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis except for the changes, in which we concur, in accounting for depreciation and depletion described in the Notes to Financial Statements.

Lybrand, Ross Bros. & Montgomery

New York, February 27, 1969.

HISTORICAL TABLE 1955-1968

YEAR	Net Income	Number of Common Shares	Income Per Share — Adjusted (1)	Funds Generated From Operations	Capital Expenditures
1968(2)	**$9,706,016**	**2,117,804**	**$4.59**	**$17,554,001**	**$14,416,405**
1967(2)	614,665	2,054,668	.29	7,971,347	18,074,371
1966(2)	8,467,627	2,046,775	4.02	14,503,682	24,611,993
1965	8,532,708	1,982,169	4.13	13,932,806	5,076,296
1964	3,302,035	1,886,625	1.61	8,784,885	3,227,790
1963	3,545,717	1,877,773	1.73	7,229,864	8,721,331
1962	3,299,904	1,877,573	1.61	7,350,579	4,446,070
1961	2,657,639	1,877,473	1.30	6,089,557	3,139,191
1960	(1,291,022)	1,877,473	(.63)	2,329,722	2,932,954
1959	2,405,095	1,877,473	1.17	6,501,502	1,732,632
1958	2,585,309	1,877,473	1.26	6,848,971	883,624
1957	2,164,979	1,877,473	1.06	6,442,864	1,968,492
1956	9,155,972	1,875,420	4.47	13,137,932	1,885,351
1955	9,040,059	1,778,534	4.43	13,221,191	3,673,328

Cash Dividends Paid	Dividends Per Share — Adjusted (1)	Percentage of Income Paid in Dividends	Net Working Capital Total	Net Working Capital Per Share — Adjusted (1)	Book Value Total	Book Value Per Share — Adjusted (1)	Non-Current Long-Term Debt	Refined Copper Production (Pounds)
$1,028,295	**$.49**	**10.59**	**$18,018,645**	**$ 8.51**	**$84,641,250**	**$39.97**	**$33,400,000**	**147,604,119**
1,025,393	.49	—	18,664,070	8.85	75,962,056	36.00	35,412,500	101,568,460
994,231	.47	11.74	18,111,475	8.60	76,178,193	36.16	22,400,000	131,069,202
236,446	.11	2.77	29,778,017	14.42	69,351,438	33.59	23,600,000	138,064,322
—	—	—	21,525,868	10.47	60,372,823	29.36	24,800,000	118,107,726
—	—	—	21,245,272	10.36	57,611,308	28.09	29,642,263	121,998,453
—	—	—	25,138,775	12.26	54,906,985	26.77	33,095,731	117,484,025
—	—	—	26,470,520	12.91	51,605,514	25.17	36,495,731	112,881,034
938,761	.46	—	26,151,143	12.75	48,947,875	23.87	39,080,731	79,583,493
938,761	.46	39.03	31,499,707	15.36	51,177,658	24.96	42,480,731	74,776,464
938,749	.46	36.31	32,852,309	16.02	49,711,324	24.24	46,861,333	86,431,989
1,876,546	.92	86.96	29,081,421	14.18	48,064,764	23.44	51,448,048	74,938,684
1,787,984	.87	19.47	29,110,347	14.21	47,723,992	23.30	51,596,274	80,426,212
621,419	.30	6.82	26,486,265	12.98	40,361,203	19.78	57,850,876	68,137,483

(1) Adjusted to reflect: 5% stock dividend 12/15/56;
3% stock dividend 12/9/65;
3% stock dividend 12/9/66;
3% stock dividend 12/6/68.

(2) Includes Copper Range Railroad Company.

JAMES BOYD

HADLEY CASE

NELSON J. DARLING, JR.

ROBERT M. McKINNEY

GEORGE OLMSTED, JR.

STEPHEN PAINE

DONALD C. POWER

JOHN R. RAND

ERNEST J. SARGEANT

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*Member of Finance Committee

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Russell B. Stearns, *Chairman of Board of Directors of Colonial Stores Incorporated and President of National Food Products Corporation, Boston, Mass.*

TRANSFER AGENTS

State Street Bank and Trust Company, Boston
Morgan Guaranty Trust Company of New York

REGISTRARS

The National Shawmut Bank of Boston
The Chase Manhattan Bank, New York

GENERAL COUNSEL

Ropes & Gray, Boston, Mass.

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Andrew D. Hunter, *Vice President — Manufacturing*

William P. Nicholls, *Vice President*

Charles L. Nielsen, *Vice President — Finance*

John V. O'Connor, Jr., *Vice President — Mining Sales*

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George R. McGrath, *Comptroller*

Donald E. Crafts, *Assistant Secretary*

J. Sidney Leonard, *Assistant Secretary and Assistant Treasurer*

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John Bley, *Vice President*

Lawrence A. Garfield, *Vice President*

Charles L. Nielsen, *Vice President — Finance*

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Harry W. Banbury, *Comptroller and Assistant Secretary*

Eino J. Salmi, *Assistant Comptroller*

Donald E. Crafts, *Assistant Secretary*

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John G. McNeely, *Vice President — Administration*

Charles H. Kaefer, *Vice President — Production*

J. Sidney Leonard, *Vice President*

Alvin W. Renken, *Vice President*

James R. Matcuk, *Comptroller*

Raymond A. Daily, *Secretary*

OFFICES

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630 Fifth Avenue, New York, New York 10020

COPPER RANGE SALES COMPANY OFFICE
630 Fifth Avenue, New York, New York 10020

MINE OFFICES
White Pine, Michigan
Houghton, Michigan

NORTHERN HARDWOODS DIVISION
Houghton, Michigan

HUSSEY METALS DIVISION

Plants

Anderson, Indiana
Eminence, Kentucky
Leetsdale, Pennsylvania

Sales Offices and Warehouses

Chicago Cincinnati Cleveland Detroit
Nashville New York Philadelphia
Pittsburgh St. Louis

COPPER RANGE RAILROAD COMPANY
Houghton, Michigan

CONTEMPORARY RESEARCH, INC.
14 Tech Circle
Natick, Massachusetts

COPPER RANGE EXPLORATION CO., INC.
630 Fifth Avenue
New York, New York

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George R. McGrath, *Comptroller*

Donald E. Crafts, *Assistant Secretary*

J. Sidney Leonard, *Assistant Secretary and Assistant Treasurer*

WHITE PINE COPPER COMPANY

James Boyd, *Chairman of Board of Directors*

John M. Haivala, *Executive Vice President*

John Bley, *Vice President*

Lawrence A. Garfield, *Vice President*

Charles L. Nielsen, *Vice President — Finance*

J. Roland Ackroyd, *Secretary and Treasurer*

Harry W. Banbury, *Comptroller and Assistant Secretary*

Eino J. Salmi, *Assistant Comptroller*

Donald E. Crafts, *Assistant Secretary*

HUSSEY METALS DIVISION

Andrew D. Hunter, *President — General Manager*

John G. McNeely, *Vice President — Administration*

Charles H. Kaefer, *Vice President — Production*

J. Sidney Leonard, *Vice President*

Alvin W. Renken, *Vice President*

James R. Matcuk, *Comptroller*

Raymond A. Daily, *Secretary*

OFFICES

GENERAL OFFICES

630 Fifth Avenue, New York, New York 10020

COPPER RANGE SALES COMPANY OFFICE

630 Fifth Avenue, New York, New York 10020

MINE OFFICES

White Pine, Michigan
Houghton, Michigan

NORTHERN HARDWOODS DIVISION

Houghton, Michigan

HUSSEY METALS DIVISION

Plants

Anderson, Indiana
Eminence, Kentucky
Leetsdale, Pennsylvania

Sales Offices and Warehouses

Chicago, Cincinnati, Cleveland, Detroit, Nashville, New York, Philadelphia, Pittsburgh, St. Louis

COPPER RANGE RAILROAD COMPANY

Houghton, Michigan

CONTEMPORARY RESEARCH, INC.

14 Tech Circle
Natick, Massachusetts

COPPER RANGE EXPLORATION CO., INC.

630 Fifth Avenue
New York, New York

COPPER RANGE COMPANY ANNUAL REPORT 1968

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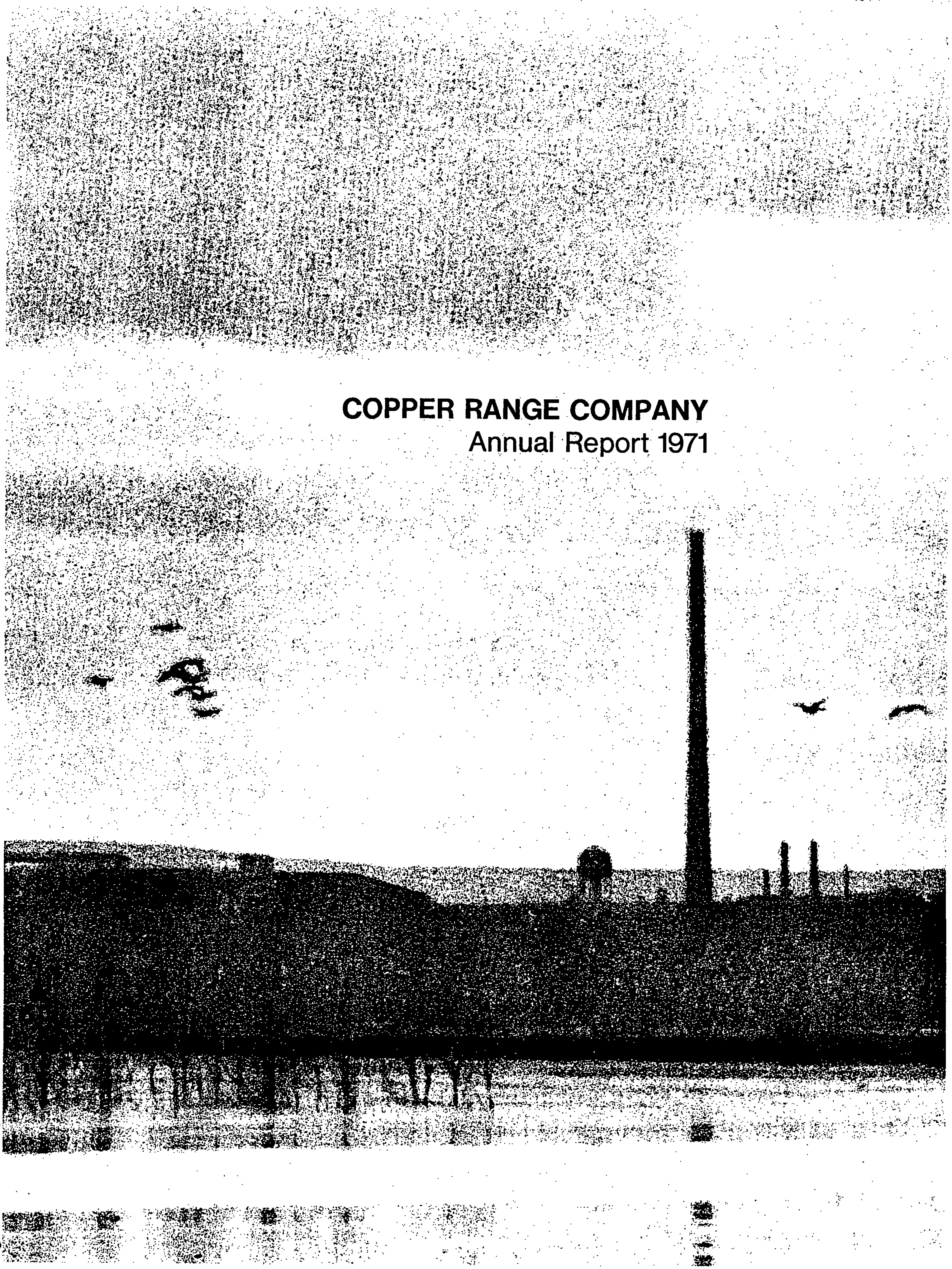
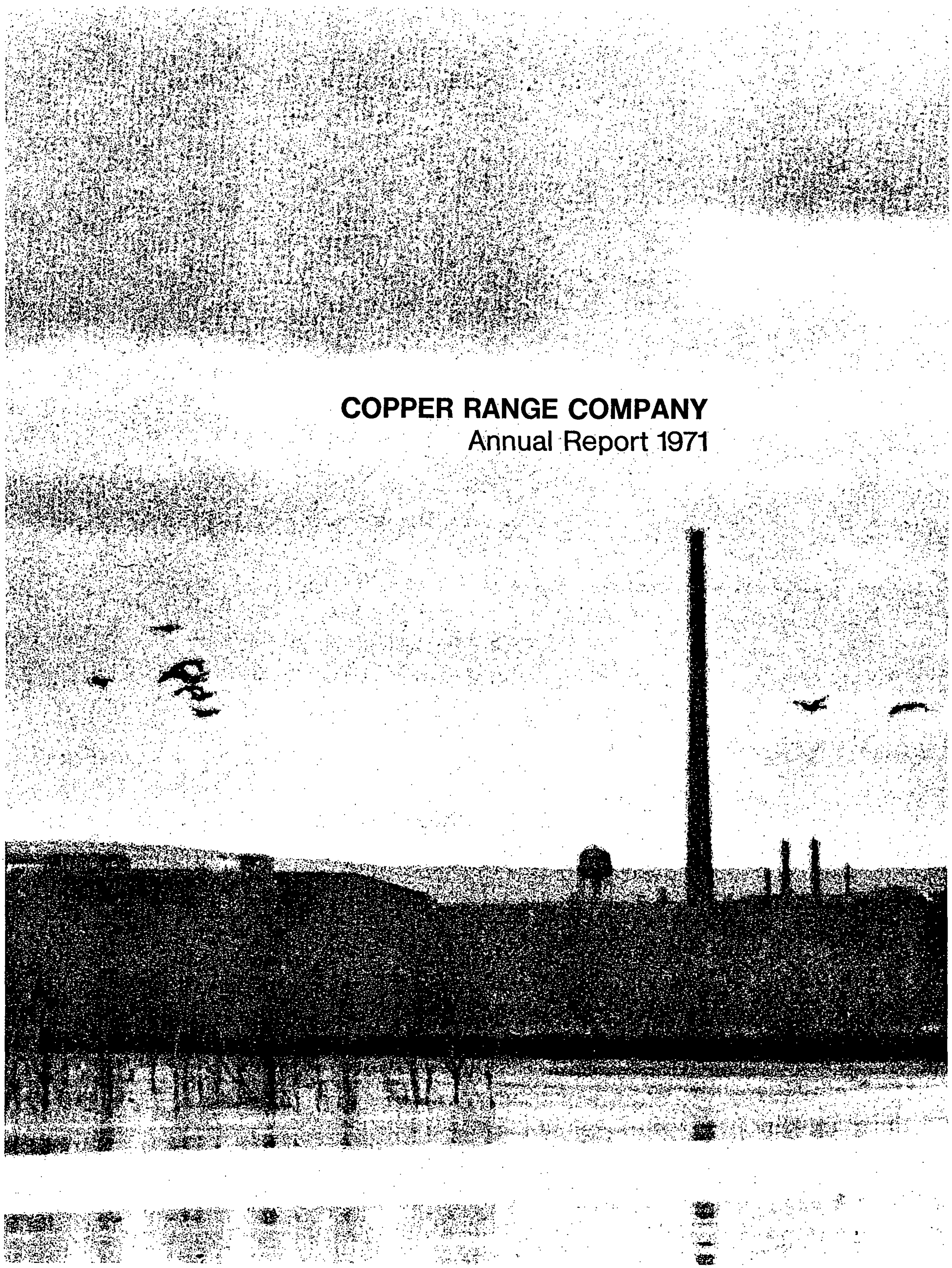
COPPER RANGE COMPANY
Annual Report 1971



COPPER RANGE COMPANY

Annual Report 1971



On the Cover—An early morning view of Canadian geese in flight over a tailings impoundment area at the White Pine Copper Company, White Pine, Michigan.

Copper Range Company
and Subsidiaries

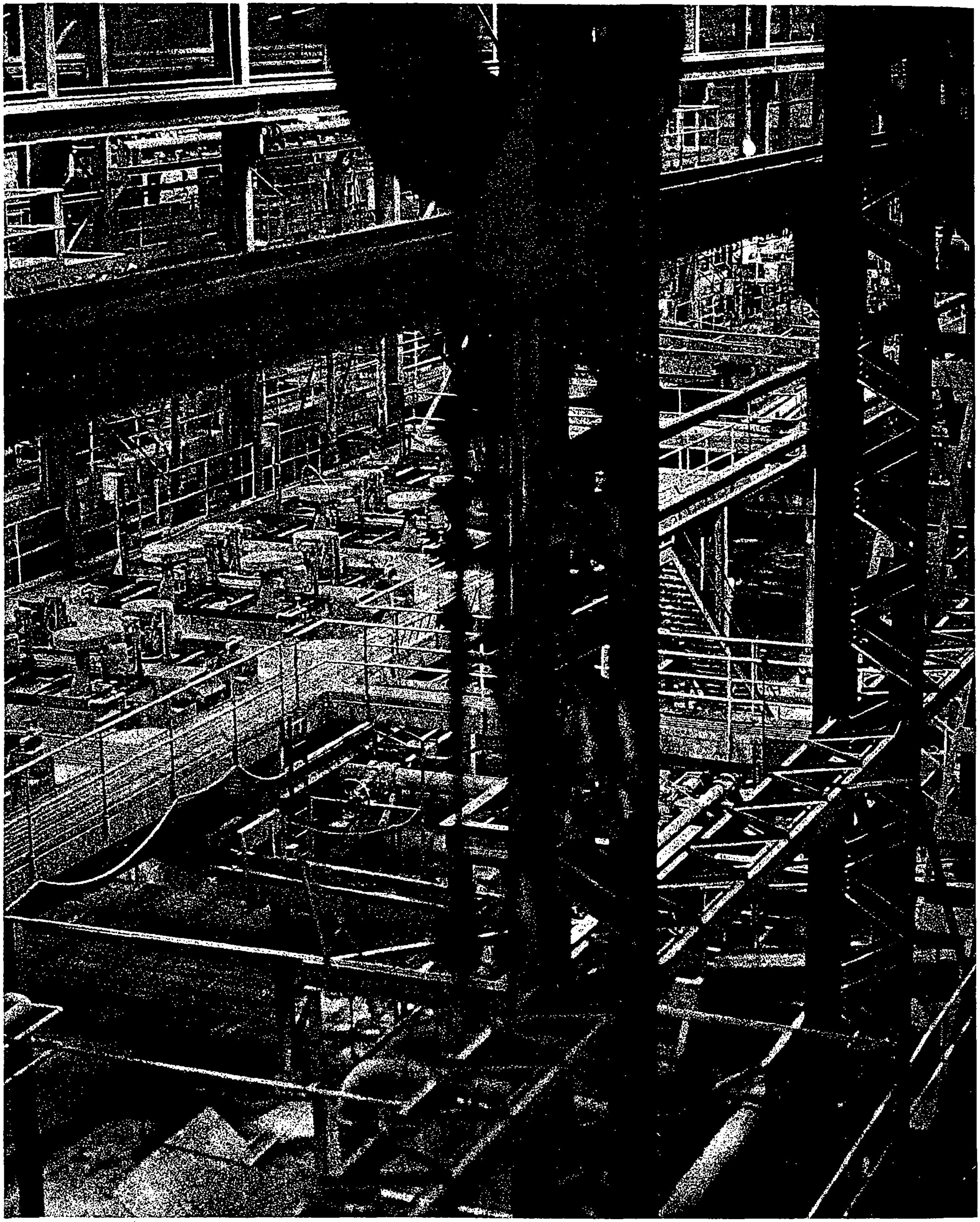
Seventy-First Annual Report
for the year ended December 31, 1971

Results at a Glance (Consolidated Basis)

	1971	1970
Net sales	**$ 88,640,822**	$ 97,453,143
Income (loss) before federal income taxes and extraordinary items	**$ (6,127,382)**	$ 13,586,119
Federal income taxes	**$ (2,600,000)**	$ 4,000,000
Income (loss) before extraordinary items	**$ (3,527,382)**	$ 9,586,119
Extraordinary items, net of taxes	**$ (2,068,321)**	—
Net income (loss)	**$ (5,595,703)**	$ 9,586,119
Income (loss) per average share*:		
Income (loss) before extraordinary items	**$ (1.51)**	$ 4.09
Extraordinary items	**$ (.88)**	—
Net income (loss)	**$ (2.39)**	$ 4.09
Dividends:		
Cash, $.25 and $.50 per share (Equivalent to $.48 per share after adjustment*)	**$ 585,870**	$ 1,116,426
Stock	**—**	5%
Capital expenditures	**$ 11,929,109**	$ 13,953,454
Depreciation and depletion	**$ 8,455,272**	$ 7,085,483
Research and exploration expenses	**$ 2,987,565**	$ 3,843,137
Cash, including certificates of deposit	**$ 6,312,276**	$ 5,671,524
Net working capital	**$ 30,267,187**	$ 25,680,246
Working capital ratio	**3.2:1**	2.5:1
Long-term debt:		
Current portion	**$ 1,301,668**	$ 5,800,000
Due after one year	**$ 36,321,457**	$ 24,300,000
Shareholders' equity	**$ 101,690,141**	$108,140,577
Book value, per share*	**$ 43.39**	$ 46.18
Ore mined (tons)	**6,861,503**	7,635,192
Copper produced (pounds)	**117,268,854**	135,596,115
Silver produced (ounces)	**634,780**	944,265
Shares outstanding at year-end	**2,343,795**	2,343,435
Approximate number of shareholders	**5,432**	5,083
Number of employees	**3,644**	3,738

*Based on average shares of stock outstanding of 2,343,525 in 1971 and 2,341,811 in 1970 after adjustment for 5% stock dividend paid in December, 1970.

Contents



Mill flotation cells, in background, free the copper particles from the waste material and float them to the cell surface for collecting and drying in concentrate form.

access to higher grade ore; and to assure adequate preparation of the mine for the long range future of the company. Accordingly, development crews were increased from four to seven, and these crews will remain active until ample development is provided. By the very nature of this essential operation development crews provide less ore tonnage per man shift than normal production crews. This, in turn, elevates per-pound production costs slightly, varying somewhat with the total volume of copper produced.

The White Pine mill has sufficient concentrating capacity to handle 25,000 tons of ore per day, and adequate smelter capacity to process the output of the concentrating plant. Although we had hoped to reach and sustain a 25,000 ton per day level of ore production during 1971, we again failed

position in 1970 to a substantial loss in 1971. Most significant among our difficulties was the eight-week strike at White Pine Copper Company—our largest and most complex operation. In addition, the labor settlement itself elevated production costs by several cents a pound.

Competitive pressures necessitated several reductions in the price of our basic commodity—refined copper shapes—in spite of the fact that the cost of our materials, supplies, and services continued to rise.

Additionally, weak markets for the copper and copper alloy products of our Hussey Metals Division continued from the two previous years, and remained with us all through 1971 resulting in another loss for the Division for the year.

Finally, a strike idled our Northern Hardwoods Division for a period of thirteen weeks contributing to a loss at that location.

Nevertheless the basic strengths of your company remain unimpaired. We own and control in the White Pine area a very large tonnage of proven copper ore. At the present rate of extraction our ore reserve will permit mining for many decades. It is one of the purest copper mineral deposits in the world. The White Pine deposit is far lower in sulfur content than many of the other domestic ore bodies. With the increasing emphasis on minimizing sulfur emissions to the atmosphere, this factor may be of increasing significance.

Another major asset of your company is the assured, long-term demand for copper. Copper was man's first engineering metal and it continues to be essential to progress in civilization. On a long-term basis the relative scarcity of copper supplies and the steadily increasing demand for copper ensure all copper produced and recovered will be sold.

Significant steps were taken during the year in a determined effort to improve efficiencies and reduce costs. Among these have been substantial reductions of salaried personnel in nonproduction departments; improved inventory control procedures; changes in the organizational structure to maximize human resources; and progress in improved labor-management relationships. Perhaps equally significant has been our decision to move most of our key corporate staff from New York to White Pine, Michigan, leaving a greatly reduced staff in the New York office. This step will permit closer day to day control over our largest operation, and minimize the New York office expense.

FINANCIAL

Earnings and Dividends The consolidated net loss for 1971 before federal taxes and extraordinary items was $6,127,382 compared with a profit of $13,586,119 in the previous year. More than half of this substantial decline was accounted for by the reduction in the selling price of copper from an average of 59.98¢ per pound in 1970 to 52.16¢ in 1971. The principal factors underlying the balance of the decline were the eight-week strike of hourly employees at the White Pine Copper Company, and higher costs across the board, including interest costs.

The tax credit of $2,600,000 for the year 1971 results mainly from the carry back of the 1971 loss to previous years.

A cash dividend of $585,870 was paid in the first two quarters of 1971. The Directors took no dividend action with respect to the third and fourth quarters.

Extraordinary Items A total of $2,068,321, net of tax benefits, was charged to earnings in 1971. These extraordinary charges arose as follows:

The Tubex Division of Copper Range Company was sold in October, 1971, producing a loss of $451,764 net of tax. The disposition of this Division, a manufacturer of welded tube from flat-roll strip, eliminated an operating loss and provided a cash addition to the working capital.

The company's interest in The Dashaveyor Company was sold in August, 1971 at a loss of $480,587 net of tax. A subsidiary of the Bendix

Corporation purchased substantially all of the assets of The Dashaveyor Company, and agreed, subject to certain overall financial limitations, to take over the responsibility for making the Dashaveyor installation at White Pine operational in accordance with a new performance specification.

The Copper Range Railroad Company's Directors and shareholders have approved a plan to discontinue the railroad operations due to operating losses both past and anticipated. Applications have been filed with the Interstate Commerce Commission for permission to carry out the plan. In anticipation of approval a provision has been made of $532,660 net of taxes for the loss expected to be sustained.

An expansion program at the White Pine mine was discontinued and its investment cost, amounting to $603,310 net of taxes, was written off.

Working Capital and Long-Term Debt Net working capital increased by $4,586,941 to $30,267,187 at December 31, 1971. Depreciation for 1971 of $8,455,272 represents an increase of $1,369,789 due principally to the cost of additional mining and research equipment. Capital additions in 1971 of $11,929,109, compared to $13,953,454 in 1970, include such substantial items as mining equipment, mill modifications, tailings dam, mine development, and the White Pine town site additions.

The company's financial condition remains strong, with working capital ratio increasing to 3.2:1 at the year end.

The company's debt was restructured in 1971 to reduce the near and intermediate term cash requirements for debt repayment and to provide additional standby lines of credit. The company borrowed $20 million from insurance companies, under 9% unsecured Promissory Notes, to be repaid in semiannual installments of $650,000 commencing June 1, 1977, with a final payment of $1.8 million on June 1, 1991. The proceeds were used for repayment of $13,500,000 in outstanding bank loans with the balance added to working capital. Long-term debt increased from $24,300,000 at the end of 1970 to $36,321,457 at December 31, 1971.

The company also executed a new credit agreement with a major New York bank which provides a two-year revolving credit of $18 million at rates ranging from prime to ¼ of 1% over prime, with conversion of the loan balance outstanding at the end of such two years to a five-year term loan at ½ of 1% over prime. Prior bank credit agreements have been terminated.

WHITE PINE

Production During 1971 production problems—both physical and technical—at our mine, mill, and smelter were under satisfactory control. The eight-week strike, which started on August 1 and ended on September 24, resulted in a loss of approximately 1,230,000 tons of ore production from the mine, and about 20,290,000 pounds of refined copper production from the smelter.

Excluding the strike period, production from the White Pine mine was slightly better than that of the previous year, but was not quite as good as that of 1969. As expected, the ore grade for 1971 averaged 1% copper (20 pounds of copper per ton of ore) which was below the average for the two prior years. Comparative data for the three-year period of 1969 through 1971 are given below:

	1971	1970	1969
Average tons of ore mined per day (excluding strike period)	22,645	21,387	22,969
Average grade of ore sent to the concentrator (in pounds per ton)	20.00	21.54	22.16
Average pounds of copper per day contained in the ore mined	452,900	460,650	509,000

The significance of the ore grade is clearly shown in the tabulation above. On the basis of daily averages, mine ore production was 5.9% greater in 1971 than in 1970, but the copper contained in the ore mined was 1.7% less. Productivity of mining personnel, measured in tons of ore produced per man shift, was the same in 1971 as it was in 1970, and slightly better than it was in 1969.

Providing access to new mining areas and preparing them for future production is known as mine development. The production problems encountered during the middle of 1970 indicated the need for accelerated mine development in order to provide greater flexibility for shifting the mining crews from one location to another; to provide access to higher grade ore; and to assure adequate preparation of the mine for the long range future of the company. Accordingly, development crews were increased from four to seven, and these crews will remain active until ample development is provided. By the very nature of this essential operation development crews provide less ore tonnage per man shift than normal production crews. This, in turn, elevates per-pound production costs slightly, varying somewhat with the total volume of copper produced.

The White Pine mill has sufficient concentrating capacity to handle 25,000 tons of ore per day, and adequate smelter capacity to process the output of the concentrating plant. Although we had hoped to reach and sustain a 25,000 ton per day level of ore production during 1971, we again failed to attain this goal. A lack of adequately trained manpower was in large part the reason for this. Training of inexperienced men for work in the mine requires many months, and a high turnover among new employees is a persistent problem. To ease this problem we have modified our hiring standards and are developing newer and more effective training techniques.

The mill (concentrator) operated during the nonstrike months of the year without unusual problems. Our continuing preventive maintenance programs have kept the mill in an excellent operating condition.

Under the topic "EXPANSION" in our 1970 Annual Report we stated that ". . . research on the circuiting and operation of our fourth and newest section of the mill indicated a means of recovering more copper from each ton of ore than previous technology had permitted." Conversion of the original three mill sections to a circuiting similar to that of the No. 4 section was successfully completed in early August. The extensive construction involved in the recircuiting was done while the mill remained in full operation. Since activation of the modified circuits, mill recovery has increased significantly; thus, at our planned production rate for 1972 the recovery of copper should be increased by approximately 1,100,000 pounds.

The smelter encountered no unusual problems during the year. It produced 116,588,551 pounds of marketable copper during the 10.2 nonstrike months. Emphasis on environmental conditions inside the smelter necessitated operating changes that reduced the furnace throughput, but this was not a serious matter as we have ample furnace capacity.

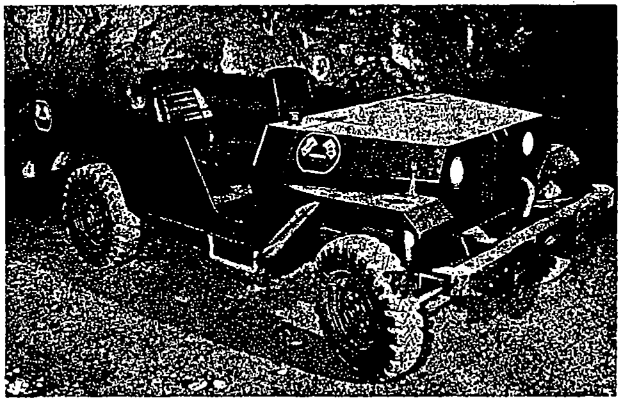
A small plant to recover copper from slag—a smelter waste product—was completed in early 1971. Substantial production of copper concentrates was anticipated during the year; however, start up problems, material handling, and related problems created delays resulting in a disappointing output. It is believed that the technical problems are being solved, and the slag treatment plant will resume operations in May when warmer weather eliminates freezing of the stockpile of crushed slag which is the plant feed.

Mining Research and Development Research and development activity continued throughout 1971 on the boring machines, longwall mining, and the Dashaveyor ore haulage system.

The development of boring machines which can yield accessibility to new mining areas at a faster rate than conventional tunneling has been an important objective for several years.

A large boring machine erected at the bottom of our No. 3 shaft three years ago to drill a circular 18′ diameter tunnel westerly about 7,500′ to connect with the workings of the White Pine mine was operational throughout the nonstrike months of the year. The machine drilled 2,802′ of tunnel which was short of expectations. This shortcoming was largely due to the frequent down time required to change the cutting tools, and the time required to support the tunnel roof in faulted zones and areas under high rock stress. The tunnel, which is designed for service and haulage, is being driven in an exceptionally hard rock formation about 50′ below the ore horizon. Our suppliers have not been able to produce cutting tools with satisfactory wear qualities for the tough rock in which the machine was operating. Late in 1971 this limitation caused us to incline the machine upward to bring it into the ore horizons which are of softer and less abrasive rock. When the machine enters the ore horizons it is anticipated that drilling progress will improve sufficiently to meet the objective rate of 600′ per month; therefore, the connection with the White Pine mine workings should be made during the first half of 1972. At the end of 1971 the machine had bored a total distance of 5,455′ leaving approximately 2,045′ before connecting with the existing White Pine mining area.

A prototype, double-headed, boring machine capable of drilling an 8′ x 16′ rectangular opening was installed in late 1970. Shortly after installation



The new "Ensign 100" underground personnel vehicle being designed and manufactured at the Company's Painesdale shops.

it was found that the machine overwhelmed its materials handling system so the operation was discontinued until adequate modifications could be made. The machine resumed operation during May but other debugging problems appeared, and these continued to limit progress throughout the year. The machine bored a total of 188′ during the year. Experimentation and debugging will be continued during 1972. If we successfully achieve a drilling rate of 600′ per month with the double-headed machine, we will have pioneered and developed a system which will materially improve our rate of access to new mining areas.

Experimentation on "longwall" mining methods has been in progress for many years. The objective has been to develop an economic system that will enhance our capability to mine at much greater depths, and to increase the grade of ore by eliminating certain types of dilution common to our present room and pillar method. Although longwall mining is well established in underground coal mines, its application to hard rock mining—such as at White Pine—is unprecedented and attended with major difficulties. Although slow, encouraging progress is being made.

A longwall working face is a few hundred feet wide in contrast to a conventional room and pillar face which is about 28′ wide. Last year encouraging results were attained with a rock breaking system that required very light blasting of long holes drilled parallel to the longwall face. A major problem in all long hole drilling is that of controlling the location of the end of the long hole since drill steel is flexible, and tends to deviate uncontrollably. After much equipment research and modification, a method of long hole drilling has been developed to the point where 115′ holes can be drilled with the end of the hole location controlled within a 12″ circle. This long hole and light blasting technique was evaluated underground during 1971 on a 115′ wide longwall face. The preliminary results were encouraging and a full size production test is planned for 1972.

In January, 1967 we installed a five-mile experimental ore haulage system from our No. 3 shaft to the mill. This prototype system—called the "Dashaveyor"—was selected in an effort to develop a more versatile and economic system for transporting ore than the expensive belt conveyor system which constitutes our present underground to surface haulage network. By the year end the system had not been brought to an operation status.

In August The Dashaveyor Company was purchased by Bendix Transportation Corporation, a wholly owned subsidiary of the Bendix Corporation. This company is making a concerted effort to bring the system to its inherent capability, and to place it in a fully operational status as soon as possible. Determination of the success or failure of the system should be completed in 1972.

Safety Accident severity, the index of injury seriousness, was dramatically improved during 1971. The 1971 severity rating of 1,151 days lost per million man hours worked was a 58% improvement when compared with the 1970 severity of 2,724. This progress is extremely encouraging since it indicates that our front line supervisors are becoming more adept at identifying and correcting conditions which traditionally have caused the more serious injuries. White Pine continues to strive for excellence in its safety programs and the mine's 1971 record is considered outstanding. The services rendered by the United States Bureau of Mines in accident prevention have materially contributed to our fine safety record.

Environmental Control During 1971 White Pine received an "A" rating from the State of Michigan for control of industrial waste water discharge, received a Soil Conservation Service Award for conservation activities, and is cooperating with the State Conservation Agency on a wild life management program in the tailings disposal areas.

The Federal Clean Air Act of 1970 set ambient air quality standards for sulfur oxides, and requires each state to file a plan for standards implementation with the Environmental Protection Agency. Michigan's plan was submitted by January 31, 1972, but at this writing its details have not been publicly released, and its reception by the EPA is not known.

The copper industry in certain western states has been under very serious pressure from the state enforcement agencies to meet a 90% emission standard. This means that 90% of the elemental sulfur contained in the copper concentrates must be removed and cannot be dispersed to the atmosphere.

Compared to western ores the White Pine ore has a low sulfur content. We presently meet both the primary and secondary air quality standards established in the 1970 Clean Air Act, but given presently available technology, we do not believe that it would be economically feasible for us to meet a 90% emission standard. A research and development effort is in progress to identify and develop a process which will reduce sulfur dioxide emissions from our White Pine smelter on a reasonably economic basis.

White Pine Community Development Late in 1971 the company acquired most of the assets of Unlimited Developments, Inc., a private land development firm in which we owned a minority stock interest. We have now completed a fully enclosed 58,000 square foot shopping mall, an attractive restaurant, lounge, and bowling alley. The shopping mall is approximately 45% occupied at present, with the remaining area under negotiation for leases. These facilities not only serve our White Pine residents but the surrounding area as well.

The rate of new residential construction in the town of White Pine was disappointing, although the population increased by 9% during the year to a total of 1,471 residents.

PRODUCT RESEARCH

A major objective of our corporate research is the development of proprietary new copper based alloys with superior physical and chemical properties which will yield a higher price per pound, broaden the earning base of the Hussey Metals Division, and make it less dependent upon traditional brass mill products.

Proprietary copper grades such as Copper Range's Silver Copper™, and SuperSilverCopper-155™, potentially offer premium prices and more secure markets compared to commodity copper grades like ETP (electrolytic tough pitch). SSC-155 sheet was introduced by Hussey in 1970 and showed encouraging growth during 1971. It offers, in our judgment, the best combination of strength, ductility, conductivity, and cost of any copper metal sheet. It has achieved increasing acceptance in the communications, electronics, and electrical equipment fields.

SSC-155 sheet's superior combination of properties and economy has prompted customer requests for it in wire form. The possibility of supplying SSC-155 billets and/or wirerod to wire mills is being investigated.

The cover of the 1970 Annual Report featured UltraBronze, a copper-base decorative metal developed by Copper Range research and introduced early in 1971 to the architectural and interior design field. Establishing a new product in this field is traditionally lengthy, but the early reception accorded UltraBronze is encouraging for the future.

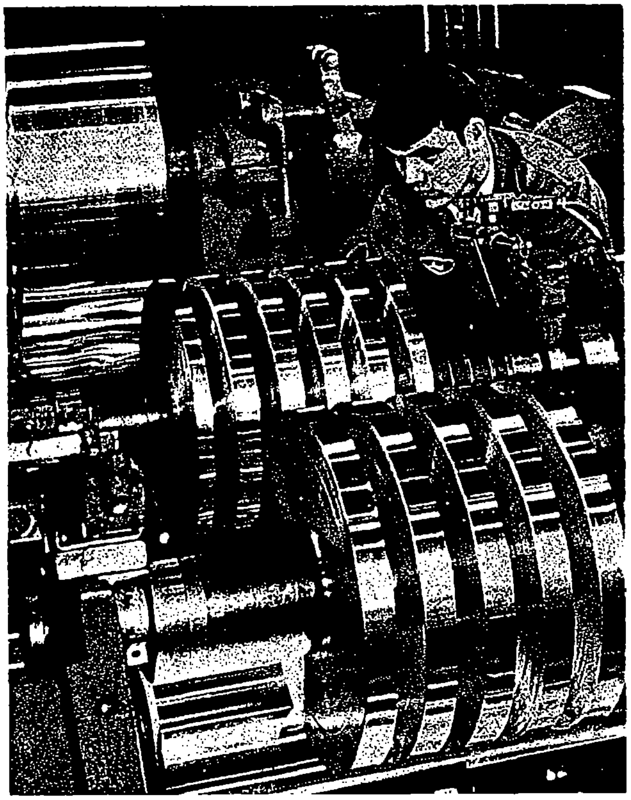
As part of Copper Range's profit center concept—the company's metallurgical research facility near Boston—Contemporary Research, Inc., has expanded into profit generating activities such as UltraBronze and a new casting method, the SPinRcasting System™. General Electric Silcast™ silicone rubber is molded and vulcanized to form mold cavities. The high temperature resistance of Silcast permits hundreds of zinc castings per mold to be made by pouring molten zinc down a central downsprue while the mold is rotating. Centrifugal force pressures the zinc into the cavities. The casting equipment is made by Romanoff Rubber Company for which CRI is the exclusive distributor for the northeast United States. CRI is well equipped to develop optimum SPinRcasting alloys and casting practices.

An UltraBronze mural created by well-known metal sculptor William Bowie is seen through the windows of a new bank on Manhattan's East Side.

The SPinRcasting System is the fastest and lowest cost way to go from a concept or a model to hundreds or thousands of strong, tough, metal replicas of the model.

EXPLORATION

Exploration for new ore deposits continued until late December when, in order to conserve corporate funds and reduce expenditures, it became necessary to make a significant reduction in the exploration staff and its activities. The curtailment and reductions are expected to eliminate $1 million of cost in 1972. Only a small geological group—the nucleus of an exploration staff—remains. These professionals will continue to evaluate the mineral potential of Michigan's Upper Peninsula where White Pine Copper Company is situated, and to evaluate other mining opportunities that are from time to time presented to the company. As economic conditions improve this cadre of geologists can again be expanded to seek further mineral opportunities for the growth of the company.



Slitting a finished thin-gauge coil of copper alloy to customer specifications.

HUSSEY METALS DIVISION

The Hussey Metals Division consists of three copper and brass mills: The principal plant at Leetsdale, Pennsylvania, and two reroll strip and bar mills at Eminence, Kentucky, and Anderson, Indiana. Its products are copper, brass and bronze strip, sheet and plate, and copper electrical bus bar. The Leetsdale plant operations start with its own melting, alloying, and semicontinuous casting of metal for its rolling operations from which a major portion of the production is finished for customers at the main plant, and the balance is shipped in semifabricated shapes to the other two plants for finishing to customers' specifications.

Hussey serves its markets through eleven sales offices and six warehouses. Besides performing as distribution centers for its own products these warehouses distribute complementary lines of copper, brass, and other metals produced by other manufacturers.

The markets for Hussey products remained very depressed during 1971. An overcapacity in the domestic mill products industry was seriously aggravated by a large increase in imports. This flow of foreign mill products was not affected in any measurable way by the temporary imposition of the surcharge. These conditions prevented any relief from the very low level of product prices which have been eroded so seriously during the past two years.

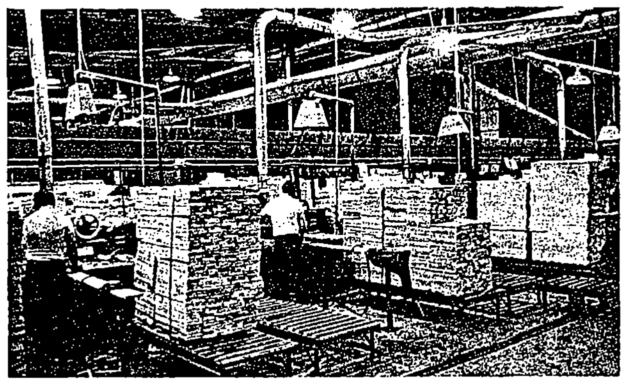
A substantial loss was incurred by the Hussey Metals Division during 1971 despite cost cutting efforts, and overhead and staff reductions begun in 1970 and continued during 1971. These efforts, plus marketing moves to increase revenues, should show beneficial results in the future.

OPERATIONS IN THE UPPER PENINSULA OF MICHIGAN

Railroad On April 2, 1971, the Copper Range Railroad Company filed an application with the Interstate Commerce Commission requesting permission to abandon its entire railroad line. This line extends from Lake Linden, Michigan, to McKeever, Michigan, a total of 69.51 miles of main track and 3.08 miles of branch line track.

The necessary documents required by the proceedings have been filed with the Interstate Commerce Commission and we now await its decision.

Northern Hardwoods Division Our forest products division encountered serious problems during the year 1971. The demand for superior grade hardwoods, such as the maple and birch produced from our lands in northern Michigan and processed at this plant, was very limited during the first half of the year. A strike by production employees of this division closed the plant from June 21, 1971, to September 20, 1971, on which date a three-year labor agreement became effective. Late in the year a strong upturn developed in the demand for our



A view of the production line at the Northern Hardwoods Division where precisely dimensioned wood panels are made for sale to furniture manufacturers and others.

hardwood products and it appears that a base for improved business during 1972 has been formed in the hardwood dimension industry.

Fabricating and Maintenance Shops Our complete fabricating and maintenance shops at Painesdale, Michigan, continued to contribute materially to the manufacture and maintenance of equipment for the White Pine operations.

The mining operations at White Pine impose great stress on our personnel vehicles and end loaders. To satisfy White Pine's need to reduce maintenance costs incurred on these outside supplied vehicles and loaders, our shops at Painesdale started manufacturing the equipment at competitive prices. Our experience with the new "Ensign 100" personnel vehicles has been excellent. The vehicle promises long life and low maintenance. Considerable interest by other mining companies has been shown in the underground personnel vehicles and a low profile end loader being built at this division.

VIII

SALES, MARKETS AND PRICE

The year 1971 was barely two weeks old when we again found it necessary to reduce our primary copper price (January 15, 1971). This price reduction to the 50¢ level was necessitated by competitive forces and prevailed for the balance of the first quarter. Toward the end of the first quarter the demand for primary copper improved, due mainly to the consumers buying strike-hedge inventories, and on March 31 we raised our price by 2.375¢ to 52.375¢ per pound. This price prevailed until November 22 when we again reduced the price to the 49⅞¢ per pound level.

This last reduction was caused by the ready availability of copper at prices several cents per pound lower than the domestic producer price. The November low of 44.59¢ per pound on the London Metal Exchange was one of the factors to trigger the reduction in the United States producer price. The 49⅞¢ per pound price was maintained through year end.

In January and February 1972, demand for primary copper showed good improvement and on February 25, 1972 our price was raised by 2¼¢ to 52⅛¢ per pound.

The copper industry strikes which our customers were anticipating took place as expected and lasted about two months. The work stoppage withheld about 200,000-250,000 tons of production from the United States market. Our customers—the copper fabricators—were experiencing such poor business that their strike-hedge inventories were more than sufficient to carry them through the strike period and well into the fourth quarter.

Lake copper wirebars (foreground) and ingotbars are shown ready for shipment from the White Pine Copper Company, White Pine, Michigan.

Sales of refined copper during the first half of 1971 exceeded our production and we were able to liquidate virtually all of the inventory we had accumulated during 1970. After resumption of operations in late September our sales were at reasonable levels even though we accumulated a small inventory by year end. Our unique silver-bearing copper, and our ability to provide our customers with large copper cakes for rolling have enabled us to maintain our sales in a sluggish market.

PERSONNEL

~~No Corporate Changes in 1972~~

In May, 1971 Chester O. Ensign, Jr., was elected President and Chief Executive Officer. During the previous year Mr. Ensign served as President and Chief Operating Officer.

Following his retirement from the company in May, 1971 Dr. James Boyd accepted a position as Executive Director of the National Commission on Materials Policy. In view of his new government position, Dr. Boyd felt compelled to resign from the Board of Directors; it was with deep regret that the Directors accepted his resignation on December 31, 1971.

INDUSTRIAL RELATIONS

As the year 1971 opened, your company and the rest of the copper industry faced the termination of their labor agreements in mid summer. Most of the industry contracts contained June 30 expiration dates; however, the White Pine contract contained a July 31 expiration date. Early in the year it became apparent that the United Steelworkers of America, which represented most of the employees in the copper industry, were going to hold firm on a "pattern settlement" under which all copper companies would pay virtually the same price regardless of the type of ore body mined and the comparative cost of operations. The key "pattern" in the nonferrous industry appears to have been that reached between the National Can Company and USW on February 16. The other major can manufacturers took a strike but soon acceded to terms almost identical to those of the National Can Company. The aluminum industry followed with settlements on May 31. Theirs, too, were with USW and the terms closely paralleled those of the can manufacturers. Thus the stage was set for the "pattern" that the copper industry ultimately accepted. White Pine, seeking some concessions because it is a higher cost producer than most of the large western open pit operations, was struck on August 1. After a prolonged period of hard bargaining it became obvious to the management of your company that the USW was immovable in its position, and that a settlement could be reached only if the company would meet the industry package already agreed to by most of the major copper companies. Continuation of the strike in what your management felt would be a futile attempt to gain concessions would have seriously jeopardized the financial health of the company. A three-year agreement was finally reached on September 24 after an eight-week work stoppage. This long and costly strike, coupled with the biggest settlement in the history of the industry, added substantially to our loss in earnings for the year, and significantly increased our costs for the future.

Last year we reported that the United Steelworkers of America had been selected as bargaining representatives by our employees at the Northern Hardwoods Division. Negotiations over the terms of an initial contract for our dimension plant started early in 1971 and continued until June 21 at which time a strike occurred. The strike ended September 20 when a reasonable three-year agreement was reached.

Another three-year agreement with the United Steelworkers of America, involving our shop employees at Painesdale, was reached September 24 prior to its September 30 expiration date and no work stoppage occurred.

On March 6, 1972, hourly employees at the Hussey Metals Division main plant at Leetsdale ratified a new three-year contract expiring March 6, 1975. The new agreement was reached without a work stoppage.

At year end the number of our employees had decreased to 3,644 from 3,738 the year before. This decrease was largely due to cost cutting reductions made in the salaried ranks throughout the company.

OUTLOOK

The outlook for 1972 is uncertain due to the continuing weakness in certain segments of our domestic economy. The weakness in foreign economies further adds to the uncertainties. The earnings that your company can generate depend to a large extent on the vigor of the domestic economy and the price of copper. Periods of substantial economic activity and growth are accompanied by a demand for our products, which permits more realistic pricing. In spite of the 2¼¢ increase in the per-pound price of copper on February 25, 1972, it remains impractical to forecast the one- to three-year price for copper at this time because there are a multitude of factors which will influence it such as the vigor of the economy, the legislative actions of ecological groups, and the actions of CIPEC nations in pricing their copper.

The longer term outlook for the copper industry and for your company is somewhat brighter, we think, than the picture presented above. The new three-year agreement at White Pine, despite its costly aspects, forces upon us the challenge of making material improvements in methods and efficiencies. We have every reason to believe that we will attain a significantly greater degree of cooperation in our effort along this line from the United Steelworkers of America. It is heartening to review the stance taken by Mr. I. W. Abel, their President, at the 25th anniversary seminar of the Federal Mediation and Conciliation Service. Mr. Abel, a member of the Pay Board, devoted his time there to pointing out the need for labor-management cooperation in increasing productivity and searching for strike alternatives.

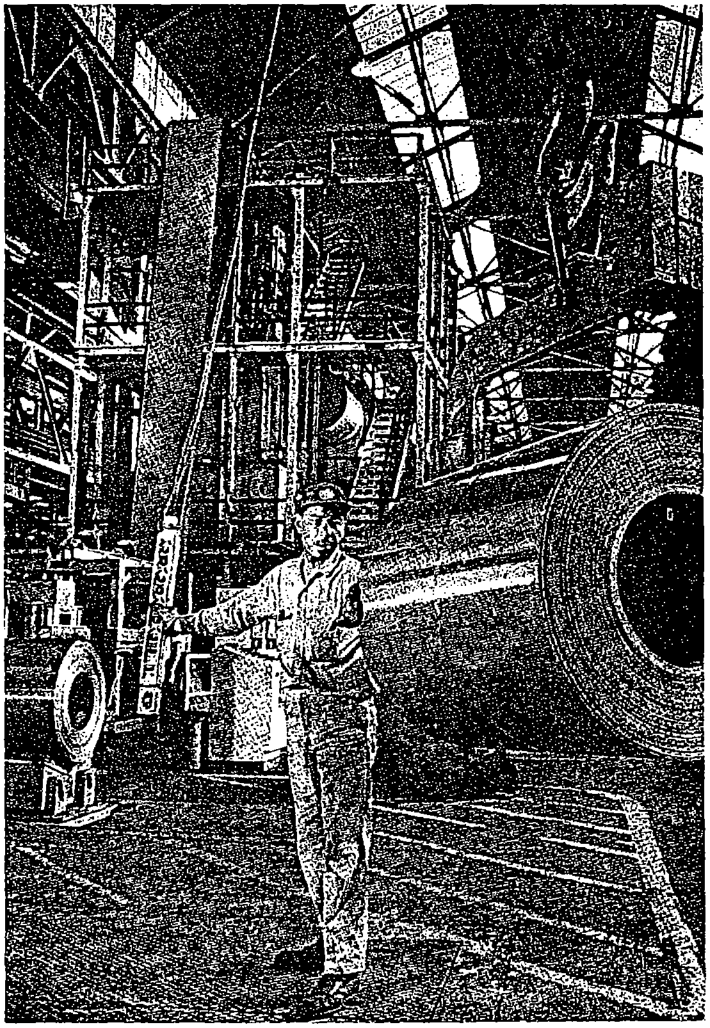
We have instituted aggressive programs of cost reduction and profit improvement, and are exercising firmer control and direction over the operations. These measures offer considerable potential for improvement in earnings when the forecasted business upturn materializes.

Chester O. Ensign, Jr.

Chester O. Ensign, Jr.
President

March 13, 1972

A 37 inch wide five ton coil of copper ready for the next step of intermediate processing.



Copper Range Company
and Subsidiaries

Consolidated Balance Sheets
December 31, 1971 and 1970

Assets

	1971	1970
Current assets		
Cash	$ 5,598,569	$ 4,882,817
Certificates of deposit	713,707	788,707
Marketable securities, at cost	2,500,000	—
Receivables, less allowance for doubtful accounts	9,474,039	12,084,351
Federal income taxes refundable	1,930,000	—
Inventories:		
Metal and metal products	12,712,682	14,027,581
Timber products	208,653	315,016
Supplies	10,218,194	10,055,147
Other	520,466	344,633
Total current assets	43,876,310	42,498,252
Investments, at cost	—	1,084,645
Property, plant and equipment, less accumulated depreciation and depletion	114,996,957	114,755,948
Deferred charges and other assets	284,771	753,019
	$159,158,038	$159,091,864

The accompanying notes are an integral part of these financial statements.

Liabilities

	1971	1970
Current liabilities		
Current portion of long-term debt	**$ 1,301,668**	$ 5,800,000
Accounts payable	**4,042,768**	4,365,407
Accrued liabilities	**6,619,400**	4,797,588
Federal income taxes	**1,645,287**	1,855,011
Total current liabilities	**13,609,123**	16,818,006
Long-term debt	**36,321,457**	24,300,000
Deferred credits and reserves	**7,507,752**	9,650,216
Minority interest in consolidated subsidiaries	**29,565**	183,065

Shareholders' Equity

	1971	1970
Capital stock, $5 par value		
Authorized—8,000,000 shares		
Issued and outstanding		
2,343,795 shares, 1971	**11,718,975**	
2,343,435 shares, 1970		11,717,175
Capital surplus	**36,033,443**	36,304,106
Earned surplus	**53,937,723**	60,119,296
	$159,158,038	$159,091,864

Copper Range Company
and Subsidiaries

Consolidated Statements of Income and Earned Surplus
For the years ended December 31, 1971 and 1970

Consolidated Income

	1971	1970
Sales and other income		
Sales	$ 88,640,822	$97,453,143
Interest income	246,008	564,595
	88,886,830	98,017,738
Cost and expenses		
Cost of sales	71,516,048	61,746,491
Depreciation and depletion	8,455,272	7,085,483
Selling and administrative expenses	8,861,909	10,137,786
Research and exploration expenses	2,987,565	3,843,137
Interest expense	2,457,738	1,784,713
Loss on disposition of plant assets	228,199	48,977
Miscellaneous, net	507,481	(214,968)
	95,014,212	84,431,619
Income (loss) before federal income taxes and extraordinary items	(6,127,382)	13,586,119
Provision for federal income taxes	(2,600,000)	4,000,000
Income (loss) before extraordinary items	(3,527,382)	9,586,119
Extraordinary items, net of tax benefit	(2,068,321)	—
Net income (loss)	(5,595,703)	9,586,119

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Consolidated Earned Surplus

	1971	1970
Balance at beginning of year	60,119,296	55,163,229
	54,523,593	64,749,348
Dividends		
Cash—$.25 and $.50 per share (Equivalent to $.48 per share after adjustment*)	(585,870)	(1,116,426)
Stock—5% (Including cash paid for fractional shares)	—	(3,513,626)
Balance at end of year	$ 53,937,723	$60,119,296
Income (loss) per average share		
Income (loss) before extraordinary items	$(1.51)	$4.09
Extraordinary items	(.88)	—
Net income (loss)	$(2.39)	$4.09

**Adjusted to reflect 5% stock dividend paid in December, 1970.*

The accompanying notes are an integral part of these financial statements.

Copper Range Company
and Subsidiaries

Consolidated Statements of Changes in Financial Position
For the years ended December 31, 1971 and 1970

Source of Funds

	1971	1970
From operations		
Net income (loss) before extraordinary items	$ (3,527,382)	$ 9,586,119
Depreciation and depletion	8,455,272	7,085,483
Net book value of asset disposals	366,476	242,644
Deferred federal income taxes	(398,734)	2,498,434
	4,895,632	19,412,680
Extraordinary items	(2,068,321)	—
Deferred federal income taxes applicable thereto	(1,700,000)	—
Extraordinary disposal and write-down of assets	3,768,321	—
Proceeds from issuance of long-term debt	20,071,457	2,500,000
Proceeds from exercise of stock options	4,381	201,431
Investments	44,445	340,355
Net change in other accounts	136,005	(967,318)
	25,151,920	21,487,148
Disposition of Funds		
Reduction in long-term debt	8,050,000	5,800,000
Capital expenditures	11,929,109	13,953,454
Cash dividends	585,870	1,116,426
	20,564,979	20,869,880
Increase in working capital	4,586,941	617,268
Working capital at beginning of year	25,680,246	25,062,978
Working capital at end of year	$ 30,267,187	$25,680,246
Increase (decrease) in working capital components:		
Cash and certificates of deposit	$ 640,752	$ (1,799,344)
Marketable securities	2,500,000	—
Receivables, net	(2,610,312)	(1,282,601)
Federal income taxes refundable	1,930,000	—
Inventories	(1,258,215)	7,121,039
Other current assets	175,833	(10,680)
Current portion of long-term debt	4,498,332	—
Accounts payable and accrued liabilities	(1,499,173)	(2,655,081)
Federal income taxes payable	209,724	(756,065)
	$ 4,586,941	$ 617,268

The accompanying notes are an integral part of these financial statements.

Notes To Consolidated Financial Statements

Principles of Consolidation

The consolidated financial statements include all subsidiaries. The accounts of 1971 and 1970 include the operations of Tubex Division from October 31, 1970 (when the Company purchased the remaining 50% interest in Tubex Corporation) through October 4, 1971 when the Company sold its interest (see Extraordinary Items). Had the Tubex operations been combined with those of the Company as of January 1, 1970 there would have been no material effect on either consolidated sales or net income for 1970.

Inventories

Inventories are valued at the lower of cost or market. Cost is computed primarily on an average cost basis for all inventories except metal inventories of the Hussey Metals Division, where the "last-in, first-out" method is used.

Property, Plant and Equipment

	1971	1970
Mines, lands, mineral rights and timber tracts, principally at cost	$ 2,172,195	$ 2,172,918
Mine development, at cost	19,830,793	16,941,384
Buildings, machinery and equipment, at cost:		
Mining facilities	132,884,299	130,307,661
Metal fabricating plants	21,196,546	21,702,250
Wood fabricating plant	2,141,961	2,137,975
Railroad property and equipment	2,498,920	2,515,183
Other	316,358	299,386
Total	181,041,072	176,076,757
Less accumulated depreciation and depletion	66,044,115	61,320,809
	$114,996,957	$114,755,948
Charges to operations for the year:		
Depreciation	$ 8,278,245	$ 6,888,495
Depletion	177,027	196,988
	$ 8,455,272	$ 7,085,483

Depreciation is computed principally on a straight-line basis over the estimated useful lives of the related assets. Depletion of the book amount of mining properties is provided on a unit-of-production basis over the estimated useful lives of the related properties.

Deferred Credits and Reserves

	1971	1970
Deferred federal income taxes, net	$ 6,726,452	$ 8,825,186
Reserve for deferred compensation	781,300	825,030
	$ 7,507,752	$ 9,650,216

Capital Stock and Capital Surplus

Changes in capital stock and capital surplus during 1970 and 1971 are summarized as follows:

	Capital Stock		Capital
	Shares	Par Value	Surplus
Balance, January 1, 1970	2,228,065	$11,140,325	$33,225,424
Exercise of stock options	5,716	28,580	172,851
5% stock dividend	109,654	548,270	2,905,831
Balance, December 31, 1970	2,343,435	11,717,175	36,304,106
Exercise of stock options	360	1,800	2,581
Relating to railroad abandonment			(273,244)
Balance, December 31, 1971	2,343,795	$11,718,975	$36,033,443

Long-Term Debt

	1971	1970
9% unsecured insurance company loans payable in semi-annual installments of $650,000 beginning June 1, 1977, and final payment of $1,800,000 June 1, 1991	$20,000,000	—
5% unsecured insurance company loans payable in semi-annual installments of $650,000 beginning June 1, 1970 and final payment of $1,800,000 June 1, 1984	17,400,000	$18,700,000
6% unsecured bank loan payable in semi-annual installments of $2,250,000 to May, 1972	—	6,750,000
¼ of 1% above prime bank rate, unsecured bank loan payable in semi-annual ascending installments of $562,500 in August, 1972 to $990,000 in February, 1975	—	4,500,000
6% unsecured bank loan payable January 15, 1973	150,000	150,000
Other	73,125	—
	37,623,125	30,100,000
Less amounts payable within one year	1,301,668	5,800,000
Net long-term debt	$36,321,457	$24,300,000

Under a new revolving bank credit agreement the Company may borrow up to $18,000,000 at rates ranging from prime to ¼ of 1% above prime. The outstanding loan balance, if any, at May 21, 1973 may be converted to a five-year term loan payable in twenty equal installments beginning August 21, 1973 at a rate of ½ of 1% above prime. No indebtedness was outstanding under this agreement at December

31, 1971. A commitment fee is payable at the rate of ½ of 1% per annum on the unused balance.

Certain of the related loan agreements contain covenants which restrict the payment of cash dividends, and require the Company to maintain a minimum amount of working capital. At December 31, 1971, no amount of consolidated earned surplus was available for payment of dividends. Working capital exceeded the requirements by approximately $15,270,000.

Key Employee Stock Option Plans

At December 31, 1971, 114,321 shares of capital stock were reserved for issuance under the Company's stock option plans for key employees. Changes during the year in shares under option were as follows:

	Number of Shares	*Aggregate Option Price*	*Option Price Range*
Options outstanding at beginning of year	22,034	$949,109	$12.17 to $46.19
Additional grant	5,000	169,375	33.88
Exercised	(360)	(4,381)	12.17
Cancelled or expired	(3,241)	(141,780)	43.67 to 43.97
Options outstanding at end of year	23,433	$972,323	$29.75 to $46.19

The plans provide for the issuance of stock options at not less than fair market value on date options are granted.

Options become exercisable in equal installments on the second and third anniversary of date of grant and expire five years from date of grant.

Retirement Plans

The Company and its subsidiaries have several retirement plans covering substantially all of their employees. The Company's policy is to fund retirement costs accrued. The total retirement expense was $2,639,092 and $2,432,095 for 1971 and 1970 respectively, which includes amortization of past service costs over periods of ten and thirty years. At December 31, 1971, the vested benefits of certain plans exceeded the pension funds and related balance sheet accruals by approximately $1,400,000.

Extraordinary Items

Extraordinary items (see President's Letter) included in net income in 1971 are as follows:

	Gross	*Tax Benefit*	*Net*
Loss on sale of an interest in The Dashaveyor Company	$ 941,940	$ 461,353	$ 480,587
Loss on sale of Tubex Division	599,907	148,143	451,764
Write-off of mill expansion program	1,182,474	579,164	603,310
Provision for loss on abandonment of railroad	1,044,000	511,340	532,660
	$3,768,321	$1,700,000	$2,068,321

Federal Income Taxes

	1971	*1970*
Currently payable (refundable)	$(2,201,266)	$1,501,566
Deferred	(2,098,734)	2,498,434
	$(4,300,000)	$4,000,000

The credit for taxes refundable includes approximately $270,000 of taxes that had been provided for in prior years.

Deferred income taxes arise principally from deducting currently for federal income tax purposes depreciation and mine development costs in excess of the amounts charged to income for financial reporting purposes. Net deferred tax credits have been adjusted in 1971 to the extent the tax benefit obtained from the loss carryback exceeds the amount refundable for tax purposes.

$2,600,000 and $1,700,000 of the 1971 tax credit has been allocated to operations and extraordinary items, respectively, in the Consolidated Statements of Income and Earned Surplus.

The investment tax credit is accounted for as a reduction of federal income taxes in the year the credit is earned. Accordingly, the 1970 provision for federal income taxes was reduced by $145,000. The Company has unused investment tax credits of approximately $832,000 including $16,000 arising in 1971, that may be carried forward as a credit against future federal income taxes.

Auditors' Report

To the Board of Directors of Copper Range Company:

We have examined the consolidated balance sheet of COPPER RANGE COMPANY and SUBSIDIARIES as of December 31, 1971 and the related statements of income and earned surplus and changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We previously made a similar examination of the financial statements for the year 1970.

In our opinion, the aforementioned consolidated financial statements present fairly the financial position of Copper Range Company and Subsidiaries at December 31, 1971 and 1970 and the results of their operations and the changes in their financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

1251 Avenue of the Americas, New York
March 1, 1972

Lybrand, Ross Bros & Montgomery

Copper Range Company
and Subsidiaries
Historical Table 1955-1971

Aug 1, 1974 next negot.

strike 1 3/4 mos.

strike 4 3/4 mos.

Strike 1 1/3 mos.

YEAR	Net Income	Number of Common Shares	Income Per Share— Adjusted (1)	Funds Generated From Operations	Capital Expenditures
1971	**$ (5,595,703)**	**2,343,795**	**$(2.39)**	**$ 4,895,632**	**$11,929,109**
1970	9,586,119	2,343,435	4.09	19,412,680	13,953,454
1969	15,866,075	2,228,065	6.80	24,797,459	12,137,694
1968	9,706,016	2,117,804	4.16	17,554,001	14,416,405
1967	614,665	2,054,668	.26	7,971,347	18,074,371
1966	8,467,627	2,046,775	3.65	14,503,682	24,611,993
1965	8,532,708	1,982,169	3.69	13,932,806	5,076,296
1964	3,302,035	1,886,625	1.45	8,784,885	3,227,790
1963	3,545,717	1,877,773	1.57	7,229,864	8,721,331
1962	3,299,904	1,877,573	1.46	7,350,579	4,446,070
1961	2,657,639	1,877,473	1.18	6,089,557	3,139,191
1960	(1,291,022)	1,877,473	(.57)	2,329,722	2,932,954
1959	2,405,095	1,877,473	1.06	6,501,502	1,732,632
1958	2,585,309	1,877,473	1.14	6,848,971	883,624
1957	2,164,979	1,877,473	.96	6,442,864	1,968,492
1956	9,155,972	1,875,420	4.05	13,137,932	1,885,351
1955	9,040,059	1,778,534	4.02	13,221,191	3,673,328

Cash Dividends Paid	Dividends Per Share—Adjusted (1)	Percentage of Income Paid in Dividends	Net Working Capital		Book Value		Non-Current Long-Term Debt	Refined Copper Production (Pounds)	
			Total	Per Share—Adjusted (1)	Total	Per Share—Adjusted (1)			
$ 585,870	**$.25**	**—**	**$30,267,187**	**$12.92**	**$101,690,141**	**$43.39**	**$36,321,457**	**117,268,854**	137.
1,116,426	.48	11.65	25,680,246	10.97	108,140,577	46.18	24,300,000	135,596,115	4
1,060,283	.45	6.68	25,062,978	10.74	99,528,978	42.64	27,600,000	156,709,694	✓ 1
1,028,295	.44	10.59	18,018,645	7.73	84,641,250	36.32	33,400,000	147,604,119	2
1,025,393	.44	—	18,664,070	8.03	75,962,056	32.64	35,412,500	101,568,460	
994,231	.43	11.74	18,111,475	7.80	76,178,193	32.82	22,400,000	131,069,202	
236,446	.10	2.77	29,778,017	12.87	69,351,438	29.96	23,600,000	138,064,322	3
—	—	—	21,525,868	9.48	60,372,823	26.58	24,800,000	118.107,726	
—	—	—	21,245,272	9.40	57,611,308	25.48	29,642,263	121,998,453	
—	—	—	25,138,775	11.12	54,906,985	24.28	33,095,731	117,484,025	
—	—	—	26,470,520	11.71	51,605,514	22.83	36,495,731	112,881,034	
938,761	.42	—	26,151,143	11.57	48,947,875	21.65	39,080,731	79,583,493	
938,761	.42	39.03	31,499,707	13.93	51,177,658	22.64	42,480,731	74,776,464	
938,749	.42	36.31	32,852,309	14.53	49,711,324	21.99	46,861,333	86,431,989	
1,876,546	.83	86.68	29,081,421	12.86	48,064,764	21.26	51,448,048	74,938,684	
1,787,984	.79	19.53	29,110,347	12.89	47,723,992	21.13	51,596,274	80,426,212	
621,419	.28	6.87	26,486,265	11.79	40,361,203	17.96	57,850,876	68,137,483	

(1) Adjusted to reflect: 5% stock dividend 12/15/56;
3% stock dividend 12/9/65;
3% stock dividend 12/9/66;
3% stock dividend 12/6/68;
5% stock dividend 12/5/69;
5% stock dividend 12/4/70.


Chester O. Ensign, Jr.


Nelson J. Darling, Jr.


George Olmsted, Jr.


Ernest J. Sargeant


Hadley Case


Jack A. James


Robert M. McKinney


F. Ward Paine


Donald C. Power


John R. Rand

Board of Directors

Hadley Case, *President of Case, Pomeroy & Company, Inc., New York, New York*

*Nelson J. Darling, Jr., *Chairman of the Board of Paine, Webber, Jackson & Curtis Incorporated, Boston, Mass.*

*Chester O. Ensign, Jr., *President of the Company*

Jack A. James, *President of Kurtz Materials Corporation, Ephrata, Pa.*

Robert M. McKinney, *President of The New Mexican, Inc., Santa Fe, New Mexico*

*George Olmsted, Jr., *Boston, Mass.*

F. Ward Paine, *President of the Ocean Science Capital Corporation, Palo Alto, Calif.*

Donald C. Power, *Chairman of the Board of Directors of General Telephone & Electronics Corporation, New York, New York*

John R. Rand, *President of John R. Rand, Incorporated, Geologic Consulting, Freeport, Maine*

*Ernest J. Sargeant, *Partner in the law firm of Ropes & Gray, Boston, Mass.*

**Member of Finance Committee*

DIRECTORS EMERITI

J. Peter Lally, *Retired*

Stephen Paine, *Trustee, Boston, Mass.*

Russell B. Stearns, *Chairman of the Executive Committee and a Director of Colonial Stores Incorporated, Boston, Mass.*

J. Robert Van Pelt, *President Emeritus, Michigan Technological University, Houghton, Michigan*

Officers

Chester O. Ensign, Jr., *President and Chief Executive Officer*
Walter L. Finlay, *Vice President*
George R. McGrath, *Vice President and Comptroller*
William P. Nicholls, *Vice President*
John V. O'Connor, Jr., *Vice President*
~~James K. Richardson, *Vice President*~~
David P. Lighthill, *Secretary and Treasurer*
E. Jean Arre, *Assistant Secretary*
Donald E. Crafts, *Assistant Secretary*

Executive Staff

Wayne S. Cavender, *Chief Geologist, Manager-Exploration*
Warren J. Jenkins, *Manager-Mining Sales*
Frederick F. King, *Manager-Taxes*

WHITE PINE COPPER COMPANY

Chester O. Ensign, Jr., *President*
John Bley, *Vice President*
Walter L. Finlay, *Vice President*
Warren J. Jenkins, *Vice President*
~~Joseph L. Patrick, *Vice President*~~
Frederick T. Wertz, *Vice President*
David P. Lighthill, *Secretary and Treasurer*
Harry W. Banbury, *Comptroller and Assistant Secretary*
Eino J. Salmi, *Assistant Comptroller*
Donald E. Crafts, *Assistant Secretary*

HUSSEY METALS DIVISION

John V. O'Connor, Jr., *President*
John G. McNeely, *Vice President-Marketing*
James R. Matcuk, *Comptroller*
Raymond A. Daily, *Secretary*

Copper Range Company
White Pine, Michigan

New York Offices
630 Fifth Avenue, New York, New York 10020

Copper Range Sales Company
White Pine, Michigan 49971

White Pine Copper Company
White Pine, Michigan 49971

Northern Hardwoods Division
Houghton, Michigan 49931

Hussey Metals Division
General Offices: Leetsdale, Pa. 15056 (Pittsburgh)

Plants: Anderson, Indiana 46011; Eminence, Kentucky 40019; Leetsdale, Pennsylvania 15056

Sales Offices and Warehouses: Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, Atlanta, Seattle, San Francisco

Unlimited Developments Incorporated
White Pine Michigan 49971

Copper Range Railroad Company
Houghton, Michigan 49931

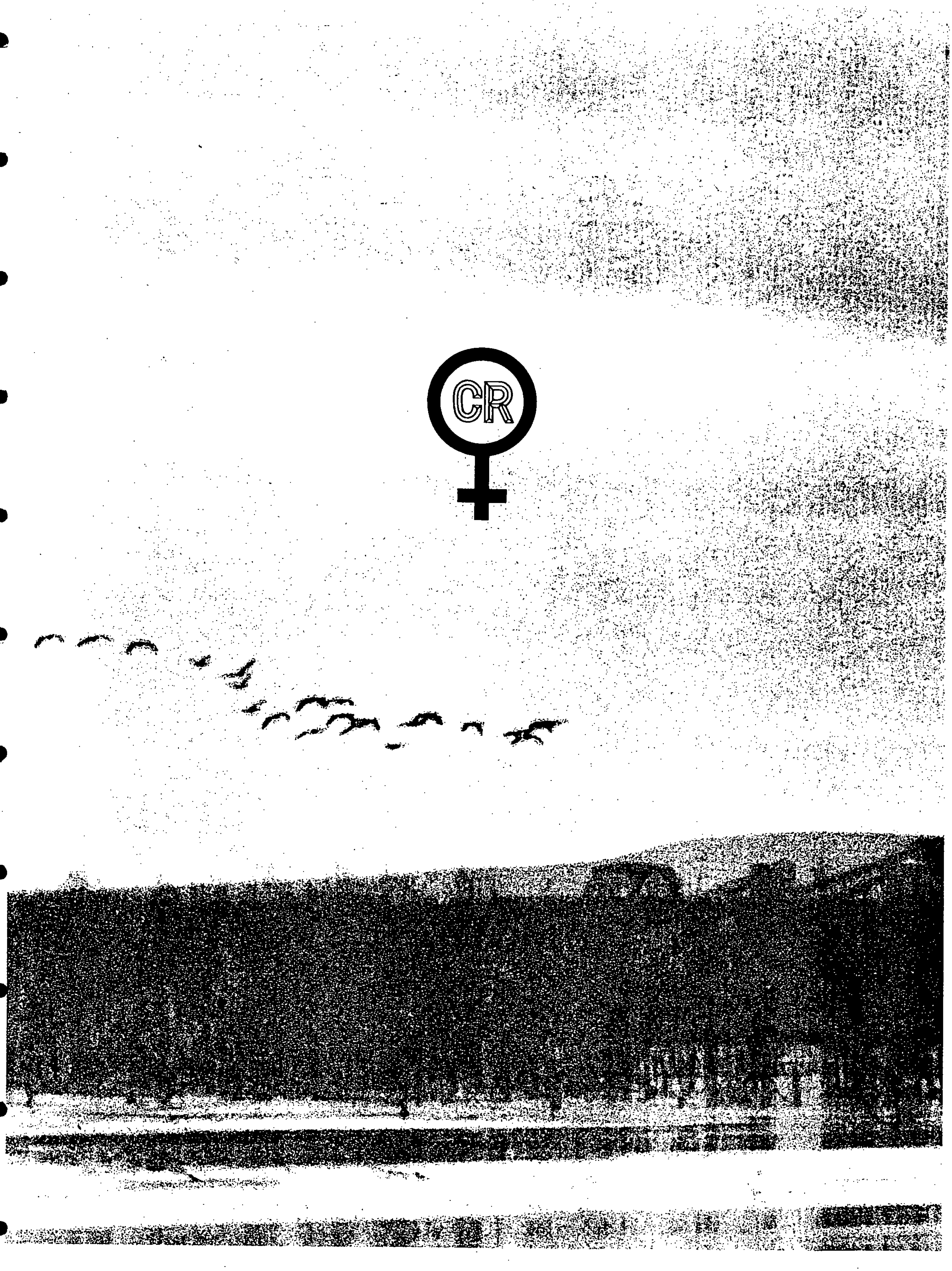
Contemporary Research, Inc.
14 Tech Circle, Natick, Massachusetts 01760

Copper Range Exploration Co., Inc.
1425 Brentwood Street, Lakewood, Colorado 80215

Transfer Agents
State Street Bank and Trust Company, Boston, Massachusetts 02107
Morgan Guaranty Trust Company of New York, New York, New York 10015

Registrars
The National Shawmut Bank of Boston, Boston, Massachusetts 02110
The Chase Manhattan Bank, N.A., New York, New York 10020

General Counsel
Ropes & Gray, Boston, Massachusetts 02110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11

CERTIFICATE OF MERGER OF LL&E DELAWARE,
A DELAWARE CORPORATION,
INTO
COPPER RANGE COMPANY,
A MICHIGAN CORPORATION

Pursuant to the provisions of Sections 707 and 731 of Act 284, Public Acts of 1972, as amended, this Certificate of Merger hereby sets forth the plan of merger in the attached and fully executed Agreement of Merger by and between LL&E Delaware, Inc., a Delaware corporation, and Copper Range Company, a Michigan corporation. The merger is permitted by the laws of the State of Delaware, the jurisdiction under which LL&E Delaware, Inc. is organized, and the plan of merger was adopted and approved by such corporation pursuant to and in accordance with the laws of that jurisdiction. The plan of merger was adopted by the Board of Directors of Copper Range Company and approved by its shareholders in accordance with Sections 701 to 704 of Act 284 described above.

Signed this 24th day of May, 1977.

Copper Range Company

By Chester O Ensign Jr
Chester O. Ensign, Jr.
Its President

LL&E Delaware, Inc.

By John G. Phillips
John G. Phillips
Its President

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AGREEMENT OF MERGER

AGREEMENT OF MERGER dated this 21st day of April, 1977 by and between Copper Range Company, a Michigan corporation ("CRC" or "Surviving Corporation") and LL&E Delaware, Inc., a Delaware corporation ("LL&E Delaware") (said two corporations being herein sometimes collectively called the "Constituent Corporations").

WITNESSETH:

WHEREAS, CRC is a corporation duly organized and existing under the laws of the State of Michigan, having been incorporated on January 23, 1899 by Articles of Incorporation filed with the Secretary of State of the State of Michigan, said Articles of Incorporation having been amended from time to time thereafter; its principal office in the State of Michigan is located in White Pine, Michigan; and

WHEREAS, LL&E Delaware is a corporation duly organized and existing under the laws of the State of Delaware, having been incorporated on March 8, 1977 by Certificate of Incorporation filed with the Secretary of State and recorded in the office of the Recorder of Deeds of the County of New Castle on that date; its principal office in the State of Delaware is located at 100 West Tenth Street in the City of Wilmington, County of New Castle; and the name of its registered agent at such office is The Corporation Trust Company; and

WHEREAS, CRC has an authorized capitalization consisting of 8,000,000 shares of Common Stock, $5 par value ("CRC Common Stock"), of which 2,343,795 shares are now issued and outstanding and no shares are treasury shares, the number of shares of outstanding CRC Common Stock being subject to change to the extent that outstanding employees' stock options may be exercised pursuant to their terms prior to the effective time of the merger of CRC and LL&E Delaware; and

WHEREAS, LL&E Delaware has an authorized capitalization consisting of 1,000 shares of Common Stock, ~~without~~ par value ("LL&E Delaware Common Stock"), all of which are validly issued and outstanding and owned by The Louisiana Land and Exploration Company, a Maryland corporation ("LL&E"); and

WHEREAS, the respective Boards of Directors of CRC and LL&E Delaware have determined that it is advisable that LL&E Delaware be merged into CRC on the terms and conditions hereinafter set forth; and

WHEREAS, on this date LL&E and CRC entered into a Preliminary Agreement for Merger with respect to the transaction set forth herein (the "Preliminary Agreement for Merger");

NOW, THEREFORE, in consideration of the mutual covenants, agreements, representations and warranties herein contained, it is agreed that, in accordance with the applicable statutes of the State of Delaware and the State of Michigan, LL&E Delaware shall be and hereby is, at the effective time of the merger, merged into CRC, which shall be the Surviving Corporation, and that the terms and conditions of such merger and the mode of carrying it into effect shall be as follows:

ARTICLE I

ARTICLES OF INCORPORATION OF SURVIVING CORPORATION

From and after the effective time of the merger and until thereafter amended as provided by law, the Articles of Incorporation of the Surviving Corporation, which is organized under the laws of the State of Michigan, shall be modified and amended so they read in their entirety as set forth in Appendix I attached hereto, which is hereby made a part of this Agreement with the same force and effect as if herein set forth in full.

As amended, such Articles of Incorporation shall provide that the aggregate number of shares which the surviving corporation shall have authority to issue shall be 1,000 shares of Common Stock, with par value of $1.00 per share ("New Common Stock").

ARTICLE II

CRC TO SUCCEED TO PROPERTIES AND OBLIGATIONS OF LL&E DELAWARE

At the effective time of the merger, LL&E Delaware shall be merged into CRC, the separate existence of LL&E Delaware shall cease and CRC shall continue in existence as the Surviving Corporation, and, without other transfer or assumption, succeed to and possess all the estate, properties, rights, privileges, powers, and franchises, as well of a public as of a private nature, and assume and be subject to all of the liabilities, obligations, debts, restrictions, disabilities and duties, of each of the Constituent Corporations, all without further act or deed, as provided in Section 259 of the Delaware General Corporation Law and Sections 721 and 722 of the Michigan Business Corporation Act.

If at any time the Surviving Corporation shall consider or be advised that any further assignments, conveyances or assurances in law are necessary or desirable to carry out the provisions hereof, the proper officers and directors of the Constituent Corporations as of the effective date of the merger shall execute and deliver any and all proper deeds, assignments and assurances in law, and do all things necessary or proper to carry out the provisions hereof.

ARTICLE III

CONVERSION OF CRC STOCK INTO LL&E STOCK

(a) At the effective time of the merger each share of CRC Common Stock outstanding immediately prior to the merger or held in the treasury of CRC, and all rights in respect thereof, shall forthwith cease to exist and be cancelled, except for the rights set forth below.

(b) At the effective time of the merger there shall be delivered in conversion of and exchange for each share of CRC Common Stock outstanding immediately prior to the merger 0.825 of a share of LL&E's Capital Stock, $0.15 par value ("LL&E Capital Stock").

(c) Each holder of a certificate or certificates representing a share or shares of CRC Common Stock immediately prior to the merger shall, upon presentation of such certificate or certificates for surrender to The Bank of New York, New York, as agent for the Surviving Corporation, be entitled to receive in exchange therefor a certificate or certificates representing the shares of fully paid and nonassessable LL&E Capital Stock to which such holder shall be entitled upon the aforesaid basis of exchange. Until so surrendered, each outstanding certificate which prior to the merger represented shares of CRC stock shall be deemed, for all corporate purposes, to evidence ownership of the number of shares of LL&E Capital Stock and the right to receive the amount of cash into which such shares of CRC stock shall have been converted and exchanged; provided, however, that no dividends or other distributions declared with respect to the LL&E stock shall be paid to the holder of any unsurrendered certificate or certificates of CRC stock until such holder shall surrender such certificate or certificates, at which time the holder shall be paid the amount of dividends, without interest, which theretofore became payable with respect to the shares of LL&E Capital Stock evidenced by such certificate or certificates.

(d) Each share of LL&E Delaware Common Stock outstanding immediately prior to the merger shall be converted into and become one share of New Common Stock, with par value of $1.00 per share, of the Surviving Corporation. Each holder of a certificate or certificates representing a share or shares of LL&E Delaware Common Stock shall, upon presentation of such certificate or certificates for surrender to the Surviving Corporation or its agents, be entitled to receive in conversion of and exchange therefor a certificate or certificates representing the number of shares of fully paid and nonassessable New Common Stock of the Surviving Corporation to which such holder shall be entitled upon the aforesaid basis of conversion and exchange. Until so surrendered, each outstanding certificate which prior to the merger represented shares of LL&E Delaware Common Stock shall be deemed, for all corporate purposes, to evidence ownership of the number of shares of New Common Stock of the Surviving Corporation into which the same shall have been converted.

(e) Notwithstanding any other provision hereof, no scrip or fractional share certificates of LL&E Capital Stock will be issued and an outstanding fractional share interest will not entitle the owner thereof to vote, to receive dividends or to any rights of a stockholder with respect to such fractional interest. Instead, if in any case the number of shares of LL&E Capital Stock for which the shares of CRC Common Stock have been exchanged shall include a fractional share, the Surviving Corporation shall pay, or cause to be paid, a cash adjustment which shall be equal to the same fraction of the last reported sales price per share of LL&E Capital Stock on the New York Stock Exchange on the last trading day on which the LL&E Capital Stock was traded on such Exchange prior to the day on which the merger becomes effective.

ARTICLE IV

SUBSTITUTION FOR CRC STOCK OPTIONS

At the effective time of the merger, LL&E shall substitute its options for CRC's rights and obligations under each then existing option under CRC's 1989 Key Employees' Stock Option Plan to acquire from CRC shares of CRC Common Stock (each such option existing immediately prior to the effective time of the merger being called an "Existing Option," and each substitute option being called a "Substitute Option"), in and by which substitution the optionee shall be entitled, upon the terms of said Existing Option, to acquire a number of shares of LL&E Capital Stock equal to 0.825 of the number of shares of CRC Common Stock which may be acquired at the effective time of the merger (with any fractional share of LL&E Capital Stock being disregarded as to each exercise) at a price per share which is 40/33 times the exercise price per share for such CRC Common Stock in effect at the effective time of the merger (rounded upward to the nearest full cent), which right shall thereafter be upon the same basic other terms and conditions as those contained in or applicable to the Existing Option. Each such Substitute Option shall constitute a continuation of the Existing Option, substituting LL&E for CRC, LL&E Capital Stock for CRC Common Stock (subject to adjustment of price and number of shares) and employment by LL&E or any of its subsidiaries for employment by CRC or any of its subsidiaries, effective as of the effective time of the merger. Otherwise, all of the terms and provisions of each Substitute Option shall be the same as the terms and provisions of the Existing Option, including, but not limited to, the times when the Substitute Option may be exercised in relation to the date of the granting of the Existing Option. At the effective time of the merger, LL&E will issue to each holder of an Existing Option a written instrument evidencing the Substitute Option.

ARTICLE V

BY-LAWS, DIRECTORS AND OFFICERS, ETC.

(a) When the Merger becomes effective the By-laws of the Surviving Corporation shall be the existing By-laws of CRC until altered, amended or repealed; provided however, that

Article III, Section 1, thereof is amended to read as follows:

"A Board of Directors of not less than three nor more than five shall manage the affairs of the Company. The number of directors which shall constitute the whole Board shall be such as shall be fixed from time to time by resolution of the Board, such number to be subject to increase or decrease by resolution of the Board at any meeting thereof, and until so fixed shall be four. The initial directors shall be as designated in Article V of the Agreement of Merger between the Company and LL&E Delaware, Inc., a Delaware corporation, and thereafter the directors shall be elected annually at the annual meeting of stockholders, and each director shall hold office until his successor shall be duly elected and qualified, or until his earlier death, resignation or removal. Any director may be removed from office, with or without cause, by the stockholders in the manner provided under the laws of Michigan.";

Article III, Section 5, thereof is amended by deleting "in either Boston, Massachusetts, or New York, New York," therefrom and replacing it with "at such places within or without the state of Michigan and";

Article III, Section 5, thereof is amended by deleting the word "four" therefrom and replacing it with the word "three";

Article IV, Section 1, thereof is amended by adding the following sentence at the end of the section:

"Notwithstanding any of the above, the initial officers shall be as designated in Article V of the Agreement of Merger between the Company and LL&E Delaware, Inc., a Delaware corporation."

and

The second sentence of Section 1 of Article VIII thereof is amended to read as follows:

"The foregoing By-Laws may also be altered, amended or repealed in any manner by the Board of Directors.".

(b) The first directors of the Surviving Corporation, who shall hold office as provided in the By-laws of the Surviving Corporation, shall be as follows:

Name	Address
John G. Phillips	Suite 1200 225 Baronne Street New Orleans, Louisiana 70112
E. J. Langhetee, Jr.	Suite 1200 225 Baronne Street New Orleans, Louisiana 70112
E. L. Williamson	Suite 1200 225 Baronne Street New Orleans, Louisiana 70112
A. Dean Becherdite	Suite 2340 Colorado State Bank Building 1600 Broadway Denver, Colorado 80202

(c) The first annual meeting of the stockholders or consent in lieu thereof of the Surviving Corporation shall be the annual meeting or consent in lieu thereof provided for the year 1978.

(d) The first officers of the Surviving Corporation, who shall hold office as provided in the By-laws of the Surviving Corporation, shall be as follows:

Name	Address
A. Dean Becherdite—President	Suite 2340 Colorado State Bank Building 1600 Broadway Denver, Colorado 80202
Edward R. Bingham—Vice President	300 West Memorial Avenue Houghton, Michigan 49931
Walter L. Finley—Vice President	Copper Range Company White Pine, Michigan 49971
Warren J. Jenkins—Vice President	630 Fifth Avenue New York, New York 10020
David P. Lighthill—Vice President, Secretary and Treasurer	630 Fifth Avenue New York, New York 10020
George R. McGrath—Vice President and Comptroller	Copper Range Company White Pine, Michigan 49971
John V. O'Connor, Jr.—Vice President	Hussey Metals Division Washington Street Leetsdale, Pennsylvania 15056

(e) If, at or after the effective time of the merger, a vacancy shall exist in the Board of Directors of the Surviving Corporation, or in any of the offices specified above, such vacancy may be filled in the manner provided in the By-laws of the Surviving Corporation.

ARTICLE VI

PURCHASE

For accounting purposes, the merger shall be treated as a "purchase".

ARTICLE VII

STOCKHOLDER APPROVAL: EFFECTIVE TIME

This Agreement of Merger shall be submitted to the stockholders of each of the Constituent Corporations as provided by the applicable laws of the State of Delaware and the State of Michigan. If this Agreement of Merger is duly approved and adopted by the requisite votes of the stockholders and is not abandoned pursuant to the provisions of Article VIII hereof, this Agreement of Merger shall be executed, acknowledged, filed and recorded first in accordance with the laws of the State of Delaware, and second a Certificate of Merger containing this Agreement of Merger shall be executed and filed in accordance with the laws of the State of Michigan as soon as practicable, but in any event within 60 days, after the last approval by stockholders. The merger shall become effective as of the close of business on the day on which this Agreement of Merger or a Certificate of Merger has been duly filed under the laws of Michigan, such time being herein sometimes called "the effective time of the merger."

ARTICLE VIII

ABANDONMENT

Prior to the effective time of the merger, this Agreement of Merger is automatically abandoned and terminated if the Preliminary Agreement for Merger is terminated pursuant to Section 13 thereof.

ARTICLE IX

MODIFICATION AND WAIVER

CRC and LL&E Delaware, by mutual consent of their respective Boards of Directors, may amend, modify and supplement this Agreement of Merger in such manner as may be agreed upon by them in writing at any time before, but not after, action thereon by the stockholders of CRC or of LL&E Delaware or both.

ARTICLE X

COUNTERPARTS

This Agreement of Merger may be executed in counterparts, each of which when so executed shall be deemed to be an original, and such counterparts shall together constitute but one and the same instrument.

IN WITNESS WHEREOF, CRC and LL&E Delaware, each pursuant to the approval and authority duly given by resolutions adopted by its Board of Directors, have each caused this Agreement of Merger to be executed by its officers thereunto duly authorized and its corporate seal to be affixed.

Copper Range Company

By Chester O Ensign Jr

President

[SEAL]

Attest:

Secretary

LL&E Delaware, Inc.

By

President

[SEAL]

Attest:

Secretary

I, David P. Lighthill, Secretary of COPPER RANGE COMPANY, a Michigan corporation, one of the corporations which is a party to the foregoing Agreement of Merger, on behalf of said corporation, hereby certifies that said Agreement of Merger was submitted to the shareholders of said corporation at a meeting thereof duly called and held in accordance with the laws of the State of Michigan on   , 1977, and at said meeting a majority of the outstanding shares of capital stock of said corporation was represented and said Agreement of Merger was approved and adopted by the votes of shareholders representing a majority of the outstanding shares of capital stock of said corporation.

WITNESS my hand this   day of   , 1977

David P. Lighthill, *Secretary*

I, Charles S. Fleet, Secretary of LL&E Delaware, Inc., a corporation organized and existing under the laws of the State of Delaware, hereby certify, as such Secretary and under the seal of the said corporation, that the Agreement of Merger dated   , 1977, between Copper Range Company and LL&E Delaware, Inc. to which this certificate is attached was duly adopted pursuant to Section 228 of Title 8 of the Delaware Code by the written consent of the holder of all of the outstanding capital stock of said corporation, and that thereby the Agreement of Merger was duly adopted as the act of the stockholder of LL&E Delaware, Inc. and the duly adopted Agreement of said corporation.

WITNESS my hand and the seal of LL&E Delaware, Inc., on this   day of   , 1977.

Charles S. Fleet, Secretary

[SEAL]

The above Agreement of Merger, having been approved by the Board of Directors of LL&E Delaware, Inc., and having been adopted by the stockholders of LL&E Delaware, Inc., in accordance with the provisions of the General Corporation Law of the State of Delaware and that fact having been certified on said Agreement of Merger by the Secretary or Assistant Secretary of LL&E Delaware, Inc., the undersigned does now hereby execute the said Agreement of Merger under the corporate seal of his corporation by authority of the directors and stockholders thereof, as the act, deed and agreement of said corporation, on this 21st day of April, 1977.

LL&E Delaware, Inc.

By John G. Phillips
John G. Phillips, *President*

[SEAL]

Attest:

By Charles S. Fleet
Charles S. Fleet, *Secretary*

Appendix I

ARTICLE I

The name of the corporation is Copper Range Company.

ARTICLE II

The purpose or purposes of the corporation are as follows:

1. To engage in and carry on the business of mining, refining, smelting and manufacturing any and all kinds of ores, minerals and metals and of manufacturing, producing and selling materials and articles of commerce composed in whole or in part of copper, brass, steel or any other metal.

2. To carry on any manufacturing, commercial, industrial, mercantile, selling, management, service or related business, operation or activity which may be lawfully carried on by a corporation organized or existing under the Michigan Business Corporation Act.

3. To have as additional purposes all powers granted to corporations organized or existing under the Michigan Business Corporation Act.

ARTICLE III

The capital stock of the corporation is 1,000 shares of Common Stock with par value of $1.00 per share.

ARTICLE IV

The address of the registered office of the corporation is The Corporation Company, 615 Griswold Street, Detroit, Michigan 48226 and the name of the resident agent at the registered office is The Corporation Company.

ARTICLE V

Any action required or permitted by the Michigan Business Corporation Act to be taken at an annual or special meeting of shareholders may be taken without a meeting, without prior notice and without a vote, if a consent in writing, setting forth the action so taken, is signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take the action at a meeting at which all shares entitled to vote thereon were present and voted. Prompt notice of the taking of the corporate action without a meeting by less than unanimous written consent shall be given to shareholders who have not consented in writing.

12

CERTIFICATE OF MERGER

of

COPPER RANGE COMPANY

and

C.G. HUSSEY & COMPANY, INC.; CHAMPION COPPER COMPANY; SAINT MARY'S CANAL MINERAL LAND COMPANY; COPPER RANGE EXPLORATION COMPANY, INC.; CONTEMPORARY RESEARCH, INC.; AND WHITE PINE COPPER COMPANY

Pursuant to the provisions of Sections 711, 712 and 733, Act 284, Public Acts of 1972, as amended, the undersigned Copper Range Company, a corporation organized and existing under the laws of the State of Michigan (hereinafter referred to as the parent corporation), owning all of the outstanding shares of each class of C.G. Hussey & Company, Inc.; Champion Copper Company; Saint Mary's Canal Mineral Land Company; Copper Range Exploration Company, Inc.; Contemporary Research, Inc.; and White Pine Copper Company, corporations organized and existing under the laws of the states of Pennsylvania (C.G. Hussey & Company, Inc.); Michigan (Champion Copper Company); New York (Saint Mary's Canal Mineral Land Company); and Delaware (Copper Range Exploration Company, Inc., Contemporary Research, Inc., and White Pine Copper Company), executes the following certificate of merger:

ARTICLE ONE.

The laws of the jurisdictions under which C.G. Hussey & Company, Inc.; Champion Copper Company; Saint Mary's Canal Mineral Land Company; Copper Range Exploration Company, Inc.; Contemporary Research, Inc.; and White Pine Copper Company are incorporated permit this type of merger.

ARTICLE TWO.

The plan of merger is as follows:

1. The name of each constituent corporation is: C. G. Hussey & Company, Inc.; Champion Copper Company; Saint Mary's Canal Mineral Land Company; Copper Range Exploration Company, Inc.; Contemporary Research, Inc.; and White Pine Copper Company (the "Subsidiaries") and Copper Range Company ("CRC"), and the outstanding shares of such corporations are as follows:

Name of corporation	Designation and number of shares in each class or series outstanding	Class or series of shares entitled to vote	Class or series entitled to vote as a class
Copper Range Company	1000 shares, $1.00 par value per share	All shares are entitled to vote; there is only one class	Not applicable
C.G. Hussey & Company, Inc.	100 shares, without par value	All shares are entitled to vote; there is only one class	Not applicable
Champion Copper Company	40 shares, $25.00 par value per share	All shares are entitled to vote; there is only one class	Not applicable
Contemporary Research, Inc.	300 shares, $100 par value per share	All shares are entitled to vote; there is only one class	Not applicable
Copper Range Exploration Company, Inc.	10 shares, $100 par value per share	All shares are entitled to vote; there is only one class	Not applicable
White Pine Copper Company	136,100 shares, $[illegible] par value per share	All shares are entitled to vote; there is only one class	Not applicable
Saint Mary's Canal Mineral Land Company	130 shares, $[illegible] par value per share	All shares are entitled to vote; there is only one class	Not applicable

2. CRC owns all of the outstanding shares of each of the Subsidiaries.

3. Each of the Subsidiaries shall restrict their operations to those necessary to wind up their affairs and liquidate and merger into CRC in accordance with the provisions of Section 332 of the Internal Revenue Code, Sections 905 and 907 of the Business Corporation Law of the State of New York, Section 253 of the General Corporation Law of the State of Delaware, Sections 711, 712 and 733 of the Business Corporation Act of the State of Michigan and Sections 902 and 902.1 of the Business Corporation Law of the State of Pennsylvania as expeditiously as possible and the merger will become effective on December 31, 1977.

4. The officers and directors of CRC and each of the Subsidiaries will take all steps necessary to carry out this plan of complete liquidation and merger. The transfer of the assets of each of the Subsidiaries to CRC by operation of law pursuant to the statutory provisions of the above-mentioned States shall be deemed a distribution in a complete liquidation solely in exchange for, and in redemption and cancellation of, the outstanding capital stock of each Subsidiary.

5. The name of the surviving company is Copper Range Company.

6. The terms and conditions of the proposed merger, including the manner and basis of converting the shares of each constituent corporation into shares, bonds or other securities of the surviving corporation, or into cash or other consideration, are:

(a) Upon the effective date of the merger, all the rights, privileges, immunities and franchises, public or private, and all property, real, personal and mixed, and all debts due on whatever account and all other choses in action of each of the Subsidiaries shall become the rights, privileges, immunities and franchises, public or private, property, real, personal and mixed, and debts due on whatever account, and choses in action of CRC.

(b) Upon the effective date of the merger, all of the outstanding shares of capital stock of each of the Subsidiaries will be cancelled.

(c) If at any time CRC, the surviving corporation, shall consider or be advised that any further assignments, conveyances or assurances in law are necessary or desirable to carry out the provisions hereof, the officers or directors of each subsidiary at the time of the merger and the officers of CRC shall execute and deliver any and all deeds, assignments and assurances in law, and do all things necessary or proper to carry out the provisions hereof.

7. There will be no amendment to the articles of incorporation of CRC, the surviving corporation.

8. There are no other provisions [illegible] this plan of complete liquidation and merger.

ARTICLE THREE.

The number of outstanding shares of each class of each of the subsidiary corporations and the number of shares of each class owned by the parent corporation is as follows:

Class	Total shares outstanding	Shares owned by parent corporation
C.G. Hussey & Company, Inc. Common stock without par value	100	100
Champion Copper Company Common stock with a par value of $25 per share	40	40
Contemporary Research, Inc. Common stock with a par value of $100 per share	500	500
Copper Range Exploration Company, Inc. Common stock with a par value of $100 per share	10	10
White Pine Copper Company Common stock with a par value of $10 per share	136,100	136,100
Saint Mary's Canal Mineral Land Company Common stock with a par value of $50 per share	150	150

ARTICLE FOUR.

The effective date of the certificate of merger shall be the 31st day of December, 1977.

Signed this 22d day of December, 1977.

COPPER RANGE COMPANY

BY [illegible]

A. DEAN BECKERDITE, PRESIDENT

13

CERTIFICATE OF MERGER

OF

COPPER RANGE COMPANY

AND

SMOKY VALLEY MINING COMPANY

Pursuant to the provisions of Sections 711 and 712 (and Section 733 if foreign corporation is one of the parties to the merger), Act 284, Public Acts of 1972, as amended, the undersigned Copper Range Company, a corporation organized and existing under the laws of the state of Michigan (hereinafter sometimes referred to as the parent corporation) owning all of the outstanding shares of each class of Smoky Valley Mining Company, a corporation organized and existing under the laws of the state of Delaware (hereinafter sometimes referred to as the subsidiary corporation) executed the following certificate of merger:

ARTICLE ONE

The laws of the jurisdiction under which Smoky Valley Mining Company is incorporated permit this type of merger.

The plan of merger is as follows:

1. The name of each constituent corporation is Smoky Valley Mining Company and Copper Range Company, and the outstanding shares of such corporations are as follows:

Name of Corporation	Designation and number of shares in each class or series outstanding	Class or Series of shares entitled to vote	Class or Series entitled to vote as a class
Copper Range Company	1000 shares, $1.00 par value per share	All shares are entitled to vote; there is only one class	Not applicable
Smoky Valley Mining Company	100 shares $100.00 par value per share	All shares are entitled to vote there is only one class	Not applicable

2. Copper Range Company owns all of the outstanding shares of each of Smoky Valley Mining Company.

3. Smoky Valley Mining Company shall [illegible] its operations to [illegible] its affairs and [illegible] and merge into [illegible] with the provisions of Section [illegible] of the [illegible] Company by

by operation of law pursuant to the statutory provisions of the above-mentioned States shall be deemed a distribution in a complete liquidation solely in exchange for, and in redemption and cancellation of, the outstanding capital stock of the subsidiary corporation.

5. The name of the surviving company is Copper Range Company.

6. The terms and conditions of the proposed merger, including the manner and basis of converting the shares of each constituent corporation into shares, bonds or other securities of the surviving corporation, or into cash or other consideration, are:

(a) Upon the effective date of the merger, all the rights, privileges, immunities and franchises, public or private, and all property, real, personal and mixed, and all debts due on whatever account and all other choses in action of [illegible] Valley [illegible] Company shall become the rights, privileges, immunities and franchises, public or private, property, [illegible] and other debts due on whatever account [illegible] Company.

[illegible]

[illegible] the title of the [illegible] and the efficiency of [illegible] execute and deliver any and all deeds, [illegible] assurances in law, and do all things necessary or [illegible] to carry out the provisions hereof.

7. There will be no amendment to the articles of incorporation of Copper Range Company, the surviving corporation.

8. There are no other provisions with respect to this plan of complete liquidation and merger.

ARTICLE THREE.

The number of outstanding shares of each class of the subsidiary corporation and the number of shares of each class owned by the parent corporation is as follows:

Class	Total shares outstanding	Shares owned by parent corporation
[illegible] Valley Mining Company Common Stock with a par value of [illegible] per share	100	100

[illegible]

(Please do not write in spaces below — for Department use)

MICHIGAN DEPARTMENT OF COMMERCE — CORPORATION AND SECURITIES BUREAU

Date Received

DEC 26 1978

FILED

Michigan Department of Commerce

DEC 29 1978

DIRECTOR

Effective December 31, 1978

14

CERTIFICATE OF DISSOLUTION

Pursuant to the Provisions of Act 198, Public Acts of 1873 as amended and Act 47, Public Acts 1955, the undersigned shareholder, being the owner of at least 3/4 of all classes of outstanding stock, executes the following Certificate of Dissolution.

--The name of the Corporation is Copper Range Railroad Company.

--The location of the Registered Office is 200 W. Memorial Avenue, Houghton, Michigan;

--The Corporations assets have been liquidated; and all known debts and liabilities of the Corporation have been paid and satisfied; and distribution has been made to all stockholders whose whereabouts are known and who have tendered their shares in accordance with any preferences applicable and provision has been made for the payment and distribution to those whose whereabouts are unknown.

--The Copper Range Company is the holder of at least 3/4 of each and all classes of outstanding stock.

Signed this 28th day of December, 1979.

COPPER RANGE COMPANY

By: R.L. Wood

15

SHARE SALE AND PURCHASE AGREEMENT

This agreement has been entered into as of October 1, 1985 among:

> **ECHO BAY INC.**, a corporation incorporated under the laws of the State of Delaware with its principal place of business in Denver, Colorado ("EBI"),
>
> and
>
> **NORTHERN COPPER CORPORATION**, a corporation incorporated under the laws of the State of Michigan with its principal place of business in White Pine, Michigan ("NCC"),
>
> and
>
> **COPPER RANGE COMPANY**, a corporation incorporated under the laws of the State of Michigan with its principal place of business in Reno, Nevada ("Copper Range").

WHEREAS EBI has agreed to sell and NCC has agreed to purchase all of the authorized, issued and outstanding shares of Copper Range, all of which shares EBI represents to be owned by it;

AND WHEREAS prior to EBI selling the Copper Range shares to NCC the parties intend that all of the assets of Copper Range other than those of its White Pine copper mining division and the shares of one of its subsidiaries, Unlimited Developments Incorporated, are to be transferred out of Copper Range such that the only assets remaining in Copper Range at the time it is acquired by NCC are the aforementioned copper related assets and shares;

NOW, THEREFORE in consideration of these premises and of the covenants and agreements herein contained the parties hereto covenant and agree as set forth below.

ARTICLE I

INTERPRETATION

Section 1.01 Definitions

Unless the context otherwise requires, the following terms and expressions shall have the meanings set forth below whenever used in this agreement:

(a) **"Capital Stock"** means the 1000 common shares with a par value of $1 each constituting all of the authorized, issued and outstanding share capital of Copper Range;

(b) **"Closing"** means the closing of the transaction contemplated by this agreement and to take place on the Closing Date;

(c) **"Closing Date"** means November 7, 1985 or such other date not later than November 15, 1985 on which banks are open for business in Denver, Colorado as may be agreed in writing between EBI and NCC;

(d) **"Copper Assets"** means all of the assets whatsoever, whether real, personal, tangible or intangible, forming the White Pine Division owned by Copper Range in the State of Michigan, which includes, without limitation, all of the assets set out in Schedule 1 to this agreement, but which term does not include the shares or assets of the Subsidiary;

(e) **"Excluded Assets"** means all assets of Copper Range other than the Copper Assets and the shares of the Subsidiary and, without limiting the generality of the foregoing, includes the Round Mountain Project, the Other Mineral Assets, the shares of CR Exploration Company, a Delaware corporation, the shares of RMGC, the note from RMGC payable to Copper Range in the amount of $28,136,273 granted to Copper Range in connection with a transfer of assets to RMGC and the Stored Assets;

(f) **"Inchoate Liens"** means liens for taxes, assessments and governmental charges which are not due and payable, which may thereafter be paid without penalty or the validity of which is currently being contested in good faith, or mechanics', carriers', workmen's, repairmen's or other like liens arising or occurring in the ordinary course of business in respect of obligations which are not overdue, other than those being contested in good faith by appropriate proceedings, in all cases which do not exceed $50,000 as to any single lien or $100,000 in the aggregate;

(g) **"Intercompany Indebtedness"** means all obligations, contingent or otherwise, of Copper Range or the Subsidiary payable to EBI or its affiliates other than obligations which will arise out of the indebtedness of Copper Range to EBI as a result of the sale and purchase transaction contemplated by this agreement;

(h) **"Lease"** means the refinery lease and option to purchase agreement relating to the White Pine Refinery entered into effective as of January 1, 1985 between White Pine Leasing, Inc., a wholly owned subsidiary of LL&E, and Copper Range;

(i) **"Lease Amendment"** means the amending agreement among White Pine Leasing, Inc., Copper Range and EBI entered into effective as of October 1, 1985 whereby certain terms of the Lease are amended;

(j) **"LL&E"** means The Louisiana Land and Exploration Company, a corporation incorporated under the laws of the State of Maryland with its principal place of business in New Orleans, Louisiana;

(k) **"LL&E Agreement"** means the representation, warranty, indemnity and release agreement among LL&E, Copper Range and EBI entered into on November 7, 1985 whereby LL&E, being the person from whom EBI acquired Copper Range on January 11, 1985, continues certain representations, warranties and indemnities to Copper Range in respect of the Capital Stock and Copper Assets and Copper Range provides certain releases to LL&E;

(l) **"Ordrich Litigation"** means the litigation instigated by Ordrich Gold Reserves Company, Inc. against Copper Range, LL&E, Felmont Oil Corporation and Case, Pomeroy & Company, Inc. on April 22, 1983 in the United States District Court for the District of Nevada, docket number LV-83-284-HEC and regarding the agreement entered into as of June 1, 1970, as amended, among the aforementioned persons or their predecessors in interest;

(m) **"Other Mineral Assets"** includes all mining properties or interests of any nature whatsoever and all other assets, corporeal or incorporeal, wheresoever located outside the State of Michigan owned directly or indirectly by Copper Range, CR Exploration Company or RMGC prior to the Closing Date;

(n) **"Purchase Price"** means the aggregate of the amounts set forth or contemplated in section 2.01;

(o) **"RMGC"** means Round Mountain Gold Corporation, a corporation incorporated under the laws of the State of Delaware with its principal place of business in Reno, Nevada;

(p) **"Round Mountain Project"** means the gold mining project situated near Round Mountain in Nye County, Nevada, in which Copper Range directly held, prior to the transfer thereof to RMGC, a 50% cotenancy interest;

(q) **"Severence Obligations"** means all severence obligations of Copper Range or the Subsidiary arising as a result of the termination of their respective employees during the period from January 11, 1985 to the Closing, but shall not encompass any obligations of Copper Range or the Subsidiary with respect to holiday or vacation benefits accruing during such period or to the termination of their respective employees who have been hired by Copper Range or the Subsidiary subsequent to September 1, 1985 at the direction of NCC, its officers or directors;

(r) **"Silver Agreement"** means the agreement to be entered into effective as of the Closing Date among EBI, NCC and Copper Range whereby, among other things, the terms of payment of the $20,000,000 balance of the Purchase Price which will remain outstanding after the Closing Date are established, as set out, without its schedules, as Schedule 3 to this agreement;

(s) **"Stored Assets"** means those certain assets located at the White Pine mine site which have been transferred to RMGC by Copper Range, and which NCC and Copper Range are to store for RMGC at no cost to RMGC, described in Schedule 4 to this agreement;

(t) **"Subsidiary"** means Unlimited Developments Incorporated, a Delaware corporation;

(u) **"White Pine Division"** means that division of Copper Range consisting essentially of the Copper Assets;

(v) **"White Pine Financial Statement"** means the unaudited consolidated balance sheet as at September 30, 1985 for the White Pine Division and the Subsidiary set out as Schedule 5 to this agreement; and

(w) **"White Pine Refinery"** means the refinery, including real and personal property, described in the Lease.

Section 1.02 **Schedules**

The following is a list of the designating number and reference name of the schedules attached to and forming part of this agreement:

Designating Number	Reference Name
Schedule 1	Copper Assets
Schedule 2	Litigation and Claims
Schedule 3	Silver Agreement
Schedule 4	Stored Assets
Schedule 5	White Pine Financial Statement
Schedule 6	Holding Period Contracts

Section 1.03 **Headings, Etc.**

The division of this agreement into articles, sections, paragraphs and clauses and the insertion of headings is for convenience of reference only and shall not affect the construction or interpretation hereof. Unless otherwise stated, all references herein to articles, sections, paragraphs or clauses are to those in this agreement.

Section 1.04 **Plurality and Gender**

Words importing the singular number only shall include the plural and vice versa and words importing the masculine gender shall include the feminine gender and words importing individuals shall include firms and corporations and vice versa.

Section 1.05 **Currency**

All references in this agreement to dollars and cents are to lawful currency of the United States of America.

Section 1.06 **Governing Law**

This agreement shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws of the State of Colorado. Each of the parties hereto irrevocably submits to the jurisdiction of any Colorado state or federal court sitting in Denver, Colorado over any action or proceeding arising out of or relating to this agreement and the parties hereto irrevocably agree that all claims in respect of such action or proceeding may be heard and determined in such Colorado state or federal court. The parties hereto also irrevocably consent to the service of any and all process in any such action or proceeding by the mailing of copies of such process to the relevant party at the address specified in Article VIII. The parties hereto agree that a final judgment in any such action or proceeding after all appeals are exhausted shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

ARTICLE II

PURCHASE AND SALE

Section 2.01 Transfer of Capital Stock

EBI hereby agrees to sell, transfer and assign to NCC and NCC hereby agrees to purchase from EBI the Capital Stock in consideration of the sum of $23,700,000 payable to EBI as follows:

(a) $3,700,000 by bank draft in immediately available funds on the Closing Date; and

(b) $20,000,000 by execution and delivery on the Closing Date of the Silver Agreement evidencing the indebtedness of NCC and Copper Range to EBI for that amount,

against delivery of the stock certificate for the Capital Stock duly endorsed on a separate stock power for transfer with signature guaranteed by The Royal Bank of Canada, together with evidence of such transfers having been approved by all necessary corporate action on the part of EBI. Additionally, NCC acknowledges that the following expenses adjusted as of the Closing Date are to be paid on such date:

(c) all costs paid by EBI or Copper Range prior to the Closing and associated with the maintenance, operation or ownership of the White Pine Division on and after October 1, 1985, exclusive of Severence Obligations, shall be for the account of NCC; and

(d) prepaid expenses, including but not limited to property taxes and insurance but excluding the October 1, 1985 payment made under the Lease, shall be for the account of NCC on and after October 1, 1985.

EBI shall estimate the amount payable by NCC pursuant to paragraphs (c) and (d) of this section 2.01 and advise NCC of such estimate prior to Closing. Within 30 days of the Closing Date EBI shall provide a reconciliation of the aforesaid estimate to NCC. If the reconciliation indicates that NCC has overpaid the actual adjustments necessary, the reconciliation shall be accompanied by EBI's cheque for any overpayment. In the event the reconciliation indicates that NCC has underpaid the actual adjustments necessary, NCC shall pay EBI any deficiency due within five days of receipt of the reconciliation.

Section 2.02 <u>Further Payments in Certain Events</u>

NCC acknowledges that EBI will be required to grant a guarantee to The Royal Bank of Canada in connection with a $1,250,000 loan to NCC from The Royal Bank of Canada made to facilitate the acquisition of Copper Range by NCC, and will also be required to grant a guarantee to White Pine Leasing, Inc. in respect of the performance of the covenants under the Lease as amended by the Lease Amendment. It is a term of this agreement and the Silver Agreement that any amounts which EBI may be required to pay out under such guarantees, exclusive of payments to exercise EBI's option to purchase the White Pine Refinery under the Lease, as amended by the Lease Amendment, shall be added to the sum payable under the Silver Agreement and shall be secured by the security granted thereunder.

Section 2.03 <u>Underlying Assets</u>

The assets that as of the Closing will form part of Copper Range shall consist of the Copper Assets and all of the shares of the Subsidiary. As of the Closing the current assets of the White Pine Division shall be equal to its current liabilities and it shall have supply inventory with an original cost of not less than $8,500,000. For greater certainty, NCC acknowledges that the underlying assets of Copper Range shall not include the Excluded Assets, which shall be assets of RMGC not subject to the sale and purchase transaction herein provided for, nor the assets associated with the White Pine Refinery (other than Copper Range's leasehold interest therein under the Lease) which, as set out in the Lease, are owned by White Pine Leasing, Inc. Additionally, NCC and Copper Range hereby agree that they shall store the Stored Assets for EBI and RMGC at the White Pine site at no cost to EBI or RMGC and RMGC shall be entitled to remove the Stored Assets from the White Pine site at its will after reasonable prior notice to Copper Range. NCC's and Copper Range's obligation to store the Stored Assets shall extend for a period of five years from the Closing Date, but neither NCC or Copper Range shall have any obligation to perform maintenance or upkeep on or otherwise protect or maintain the Stored Assets and the Stored Assets shall be stored at RMGC's sole risk, NCC or Copper Range only to be liable for wilful or negligent acts of their directors, officers, employees or agents causing damage to the Stored Assets. Further, RMGC shall indemnify and hold NCC and Copper Range, their directors, officers, employees and agents, harmless against any loss, damage, liability or obligation that they or any of them might incur arising out of related to the storage of the Stored Assets, other than any loss, damage, liability or obligation arising out of wilful or negligent acts of their directors, officers, employees or agents.

Section 2.04 **Further EBI Covenants**

EBI will also:

(a) provide NCC the following information relating to the operations of the White Pine Division and the Subsidiary, to the extent EBI has same and it is not already in the possession of Copper Range, all without further cost to NCC:

(i) all current mine engineering studies, drawings and operating manuals relating to the Copper Assets,

(ii) all title documents to assets owned by Copper Range relating to the Copper Assets or the Subsidiary,

(iii) copies of corporate and tax returns filed on behalf of Copper Range or the Subsidiary for the past five years,

(iv) all contracts and performance guarantees relating to the Copper Assets or the Subsidiary, and

(v) such further documents relating to operations of Copper Range or the Subsidiary which NCC may reasonably request,

and EBI shall not destroy any such documents in its possession relating to the White Pine Division or the Subsidiary prior to December 31, 1989 without NCC's prior written approval, which shall not be unreasonably withheld.

ARTICLE III

REPRESENTATIONS AND WARRANTIES OF EBI

Section 3.01 <u>Representations and Warranties</u>

EBI represents and warrants to NCC as follows:

(a) Copper Range and the Subsidiary are respectively corporations duly incorporated under the laws of the State of Michigan and the State of Delaware and each is validly existing and in good standing under the laws of its jurisdiction of incorporation;

(b) the authorized, issued and outstanding capital of each of Copper Range and the Subsidiary is:

Corporation	Class	Authorized	Issued and Outstanding
Copper Range	common shares	1000	1000
Subsidiary	common shares	1000	1000;

(c) EBI is the beneficial owner of the Capital Stock, has full corporate power and authority to conduct its business as it is now carried on and to sell the Capital Stock to NCC and as of the Closing will be entitled to sell the Capital Stock to NCC free and clear, except for Inchoate Liens, of (i) any pledge, lien, encumbrance, equity, voting trust, security interest or claim of any kind or character, and (ii) any rights of third persons to purchase or assert any claim of any kind or character whatsoever against any of the shares constituting the Capital Stock, which have, whether in respect of (i) or (ii), been granted or created by EBI during the period it owned the Capital Stock, being January 11, 1985 to the Closing Date;

(d) no order, consent, approval or authorization of any public body, agency, commission, board, court or administrative tribunal, other than compliance with and the expiration of the applicable waiting period pursuant to the provisions of the Hart-Scott-Rodino Act (United States), is necessary to the sale and transfer of the Capital Stock by EBI nor the performance by EBI of its obligations under this agreement and the execution and delivery of the documents and instruments referred to herein;

(e) Copper Range will not be subject to any civil, criminal or contractual obligation or liability relating to or arising out of any action taken or omission by EBI or Copper Range in the maintenance, operation or ownership of Copper Range during the period from January 11, 1985 to the Closing Date except insofar as activities of the directors, officers, employees or agents of NCC have affected such maintenance, operation or ownership and except, as regards contractual obligations, for those having cost to Copper Range of $10,000 or less and those set out in Schedule 6 hereto;

(f) to EBI's knowledge the only material litigation or proceedings pending or threatened against Copper Range are those disclosed to EBI by LL&E at the time EBI acquired Copper Range from LL&E in Schedule 11 to the agreement between EBI and LL&E in respect of such sale and purchase and the additional claims set out in the addendums contained in Schedule 2, all as set out in Schedule 2 to this agreement;

(g) EBI and Copper Range have not taken and will not take any action during the period from January 11, 1985 to the Closing Date which would materially and adversely affect the title to or operation of the Copper Assets except for actions taken at the request of NCC's directors, officers, employees or agents and for EBI's and Copper Range's actions in disconnecting certain equipment as part of the shut down activities undertaken by Copper Range;

(h) the White Pine Financial Statement has been prepared on the basis disclosed in the notes thereto and EBI has no reason to believe that it does not present fairly the asset and liability position of the White Pine Division and the Subsidiary on the basis presented as at September 30, 1985;

(i) there has been no material adverse change in the assets or liabilities of the White Pine Division and the Subsidiary taken as a whole from that set forth in the White Pine Financial Statement except for (i) the continuing expenses of the White Pine Division and the Subsidiary generated at a level of expenses consistent with that experienced during the nine months ended September 30, 1985 and (ii) trade or business obligations incurred after September 30, 1985 in connection with the maintenance of the Copper Assets and assets of the Subsidiary;

(j) neither Copper Range nor the Subsidiary will have any outstanding Intercompany Indebtedness or bank indebtedness (other than the indebtedness of the Subsidiary shown as long term debt in the White Pine Financial Statement) at the Closing Date;

(k) none of EBI, Copper Range or the Subsidiary will become liable for the payment of any commissions or compensation in the nature of finders fees to any broker or agent acting on behalf of EBI, Copper Range or the Subsidiary in connection with the transaction contemplated by this agreement (it being understood that the fees of Salomon Brothers Inc and all of the lenders for this transaction (except EBI), or any of their agents, shall be solely for the account of NCC); and

(l) the Lease, as amended by the Lease Amendment, is in full force and effect, no event of default has occurred thereunder and no event or circumstances have occurred or exist that, with notice or the passage of time or both, would mature into an event of default thereunder.

Section 3.02 Acknowledgment and Limits of Reliance

NCC acknowledges that EBI has entered into this agreement and agreed to sell Copper Range to NCC at the price and with the deferred balance payments herein and in the Silver Agreement provided for based upon the premise that the sale and purchase of Copper Range is being transacted with the limited negotiated representations and warranties contained in section 3.01 and that the only representations or warranties of EBI upon which NCC is entitled to rely in respect of the sale and purchase contemplated by this agreement are those expressly set out in section 3.01 and in the officers' certificate to be delivered pursuant to paragraph (g) of section 5.01 and those contained in the opinion of the attorneys for EBI to be delivered pursuant to paragraph (f) of section 5.01. Without limiting the generality of the foregoing, NCC acknowledges that **there are no implied warranties in the sale and purchase transaction contemplated by this agreement, including, without limiting the generality of the foregoing, implied warranties of merchantibility or fitness for any purpose.** EBI's knowledge of the Copper Assets and the Subsidiary is limited by the fact that EBI simply maintained same for its limited ownership period from January 11, 1985 to the Closing Date and never operated such assets. Further, NCC's recourse and EBI's liability for any breach of any one or more of the representations or warranties set out in section 3.01 shall survive the closing of the purchase and sale of Capital Stock herein provided notwithstanding such closing and continue and remain in full force and effect for the benefit of NCC up to but not after January 11, 1990.

Section 3.03 <u>LL&E Representations, Warranties and Indemnities</u>

NCC acknowledges that it has, through Copper Range, received the benefit of certain representations, warranties and indemnities in respect of the Capital Stock and Copper Assets directly from LL&E and that EBI has no responsibility whatsoever for the representations, warranties and indemnities of LL&E, it being understood that NCC shall have no recourse against EBI for any breach of the LL&E representations, warranties and indemnities. Nothing in this section 3.03 shall be construed so as to abrogate or limit in any way the right of NCC to recourse against EBI for indemnification pursuant to the provisions of section 6.01.

ARTICLE IV

ADDITIONAL COVENANTS

Section 4.01 <u>Covenants of EBI</u>

EBI:

(a) will cause Copper Range and the Subsidiary at all reasonable times after announcement of the transaction contemplated by this agreement and prior to the Closing Date to permit representatives of NCC full access to their property and books and records relating to the White Pine Division or the Subsidiary, including contracts, agreements and minute books, to give NCC and its representatives such information with respect thereto as may be required to permit NCC to make such audit of the books of account of the White Pine Division and the Subsidiary and physical verification of the inventory and fixed assets of the White Pine Division and the Subsidiary as NCC may see fit. The provisions of this paragraph (a) of this section 4.01 are without prejudice to the representations and warranties of EBI set forth in Article III and the conditions in favour of NCC set forth in Article V;

(b) will forthwith after execution and delivery of this agreement take such steps and proceedings as may be reasonably required to obtain all necessary consents and approvals to be obtained on its part from governments, government agencies or instrumentalities and others with respect to the transactions contemplated by this agreement and will comply with all applicable statutes and regulations;

(c) has and will promptly pay when due all taxes whatsoever, including, without limitation, income and real and personal property taxes, which Copper Range is legally required to pay and which were incurred during the period from January 11, 1985 to October 1, 1985, provided, however, that EBI shall not be obliged to pay such taxes so long as it is contesting Copper Range's obligation to pay in good faith;

(d) will not in any way interfere with NCC's possession, through Copper Range, of the Copper Assets or, through Copper Range and the Subsidiary, the assets of the Subsidiary after the Closing, provided, however, that nothing herein contained shall be construed as in any way abrogating or limiting any of EBI's rights under the Silver Agreement or any security granted thereunder; and

(e) will, at or prior to the Closing, cause all directors and officers of Copper Range and the Subsidiary to resign and will, prior to the Closing, terminate all employees of Copper Range and the Subsidiary.

Section 4.02 **Covenants of NCC and Tax Returns**

(a) NCC will forthwith after execution and delivery of this agreement take such steps and proceedings as may be reasonably required to obtain all necessary consents and approvals to be obtained on its part from governments, government agencies or instrumentalities and others with respect to the transactions contemplated by this agreement and will comply with all applicable statutes and regulations;

(b) with respect to all tax returns or other levy forms which EBI or Copper Range may be obliged to file in respect of the period during which EBI owned Copper Range:

(i) NCC will co-operate with and assist EBI, at EBI's request, by furnishing all documents and records in its possession or control necessary in connection with the preparation of such returns, and any audit, investigation, administrative proceeding or litigation in respect thereof,

(ii) EBI will furnish to NCC, at least 20 days prior to the filing thereof, copies of all its material federal and state tax returns for the period it owned Copper Range. NCC will have the right to comment upon such tax returns prior to the filing thereof, and EBI will consider NCC's suggestions thereon but shall not be obligated to adopt any of NCC's suggestions in the event that EBI would be adversely affected by such adoption,

(iii) EBI will furnish NCC with copies of all such material tax returns promptly after they are filed, to the extent that they differ from the returns furnished under subparagraph (ii) of this paragraph (b) of this section 4.02,

(iv) NCC will not file any returns or take any action which will have the effect of being inconsistent with the elections made or revoked or tax reporting positions taken by EBI, nor will it initiate any investigation or inquiry of the Internal Revenue Service (the "IRS") or other revenue authorities in respect of any such returns, and

(v) in the event that any position taken by EBI in any of Copper Range's tax returns is challenged by the IRS or other revenue authorities, and it is finally determined (after exhaustion of all administrative recourse and right of appeal) that EBI's position is not permitted, then NCC may amend its returns to take a position not inconsistent with EBI's tax position, as modified in accordance with the final determination or judgment in such proceedings; and

(c) NCC will co-operate with and assist EBI, at EBI's direction, sole expense and in its sole discretion, in respect of the defence of the Ordrich Litigation and shall not in any way interfere with EBI's control or direction of the Ordrich Litigation or the Copper Range defence thereof.

ARTICLE V

CONDITIONS

Section 5.01 <u>Conditions in Favour of NCC</u>

The purchase and sale of the Capital Stock is subject to the following terms and conditions to be performed or satisfied at or prior to the Closing, the same terms and conditions being inserted for the benefit of NCC and may be waived in whole or in part prior to Closing by NCC giving written notice thereof to EBI, and shall be deemed to be satisfied or waived upon Closing:

(a) EBI, Copper Range and the Subsidiary will have made available to the representatives of NCC all contracts, files, books, accounts, records and other financial and accounting data of the White Pine Division and the Subsidiary in their possession in order to enable such representatives to make an examination of the same;

(b) Copper Range and the Subsidiary will have made available to NCC all incorporation documents, minute books and other corporate records and all documents of title and related records and other data of Copper Range relating to the White Pine Division and the Subsidiary in order to enable the representatives of NCC to make an examination of the same;

(c) no substantial damage resulting from fire or other hazard which materially and adversely affects the value of the White Pine Division, and no material and adverse change in the Copper Assets, shall have occurred prior to the Closing Date, provided, however, that any material and adverse change in the state of the copper or other metal markets shall not in any way be construed as a material and adverse change in the Copper Assets;

(d) at or prior to the Closing, all directors and officers of Copper Range and the Subsidiary will resign as directors and officers and EBI shall terminate all employees of Copper Range and the Subsidiary;

(e) any consent, order, approval or authorization of any public body, agency, commission or board necessary for the sale and transfer of the Capital Stock or the performance by EBI of its obligations under this agreement and the execution and delivery of the documents and instruments referred to herein shall have been obtained, including due and timely compliance with the provisions of the Hart-Scott-Rodino Act (United States);

(f) at the Closing NCC will be furnished with the opinion of the attorneys for EBI addressed to NCC and its attorneys to the effect that:

(i) each of EBI, Copper Range and the Subsidiary has been duly incorporated and is in good standing under the laws of its respective jurisdiction of incorporation,

(ii) the transfer of the Capital Stock by EBI in accordance with the terms hereof has been properly authorized and the execution and delivery by EBI of all documents, conveyances and instruments required by this agreement at or prior to the Closing has been properly authorized and no other consents, approvals or authorizations are necessary or required,

(iii) EBI has the full right and authority to effect the sale, conveyance and transfer of the Capital Stock to NCC in accordance with the terms hereof and, except for loan agreements in respect of which consent is to be obtained and valid and enforceable consents have been obtained, such attorneys do not know of any material contract to which EBI is a party which the completion of the transactions herein contemplated might conflict with or result in the breach of or constitute a default under,

(iv) the Capital Stock represents all shares of the capital stock of Copper Range presently issued and outstanding, and

(v) such attorneys do not know of any litigation or other proceedings pending or threatened against EBI which would affect the transactions herein contemplated and the only material litigation of which such attorneys are aware and to which Copper Range is a party is that set out in Schedule 2 to this agreement.

In furnishing their opinion EBI's attorneys may rely on the opinion of local attorneys upon whose opinions they are of the opinion they are entitled to rely. Attorneys to EBI may also rely, as to matters of fact, upon certificates as to such facts signed by a senior officer of EBI;

(g) the representations and warranties set forth in Article III hereof will be true in all material respects immediately prior to Closing as though such representations and warranties were made at such time and at the Closing NCC shall be provided with a certificate executed by the President and the Senior Vice-President, Finance of EBI to the effect that to the best of the knowledge of such persons all representations and warranties made in Article III are as valid and effectual immediately prior to Closing as if made at such time;

(h) the covenants set forth in Article IV to be performed prior to Closing shall have been performed by EBI;

(i) arrangements satisfactory to NCC in respect of financing aggregating $32,500,000 in loans, including loans advanced prior to the Closing Date, and grants for the acquisition of Copper Range by NCC and the operation of Copper Range thereafter shall have been made;

(j) at the Closing EBI, in co-operation with NCC, will take such necessary corporate actions and proceedings as are required to give effect to the required resignations of the directors and officers of Copper Range and the Subsidiary in favour of NCC or of the nominees of NCC and to permit the due and valid transfer at the Closing of the Capital Stock; and

(k) at the Closing EBI will deliver to NCC the corporate seal of Copper Range and the Subsidiary and constructively deliver all corporate records and books of account of Copper Range relating to the Copper Assets and of the Subsidiary which are in EBI's possession including, without limiting the generality of the foregoing, the minute books and annual reports for Copper Range and the Subsidiary, provided, however, that EBI and LL&E shall thereafter have the right of access, inspection and copying of any of such documents to the extent they do or will contain information or record transactions up to and including the Closing Date in the case of EBI and up to and including January 11, 1985 in the case of LL&E.

Section 5.02 <u>Conditions in Favour of EBI</u>

EBI's obligation to sell the Capital Stock is subject to the following terms and conditions to be performed or satisfied at or prior to the Closing, the same terms and conditions being inserted for the benefit of EBI and may be waived in whole or in part prior to Closing by EBI giving written notice thereof to NCC, and shall be deemed to be satisfied or waived upon Closing;

(a) any consent, order, approval or authorization or any public body, agency, commission or board necessary for the sale and transfer of the Capital Stock or the performance by NCC of its obligations under this agreement and the execution and delivery of the documents and instruments referred to herein shall have been obtained, including due and timely compliance with the provisions of the Hart-Scott-Rodino Act (United States);

(b) EBI having obtained consent to the transactions herein contemplated as required by the provisions of the agreement entered into as of January 4, 1985 among EBI, Canadian Imperial Bank of Commerce and Echo Bank Mines Ltd.;

(c) at the Closing EBI will be furnished with the opinion of the attorneys for NCC addressed to EBI and its attorneys to the effect that:

(i) NCC has been duly incorporated and is in good standing under the laws of its jurisdiction of incorporation,

(ii) the purchase of the Capital Stock by NCC in accordance with the terms hereof has been properly authorized and the execution and delivery by NCC of all documents and instruments required by this agreement at or prior to the Closing has been properly authorized and no other consents, approvals or authorizations are necessary or required, and

(iii) such attorneys do not know of any litigation or other proceedings pending or threatened against NCC;

(d) at the Closing NCC shall deliver to EBI evidence satisfactory to EBI that an agreement concerning labour for Copper Range subsequent to the transfer of the Capital Stock has been entered into and that such agreement is sufficient in all material respects to permit commencement of operations at the White Pine mine and related facilities;

(e) EBI shall have obtained from LL&E and NCC an option in form and substance satisfactory to EBI and its attorneys to acquire the White Pine Refinery in the event that NCC defaults under the Silver Agreement or the Lease, as amended by the Lease Agreement;

(f) at the Closing NCC shall have duly executed and delivered the Silver Agreement and the documents thereby contemplated; and

(g) arrangements satisfactory to EBI in respect of financing aggregating $32,500,000 in loans, including loans advanced prior to the Closing Date, and grants for the acquisition of Copper Range by NCC and the operation of Copper Range thereafter shall have been made.

ARTICLE VI

INDEMNIFICATION

Section 6.01 <u>Indemnification by EBI</u>

Without in any way derogating from the covenants, conditions, representations and warranties herein contained, EBI shall, subject to the limitations set forth below, indemnify and save NCC and Copper Range, and each director, officer, employee or agent thereof, harmless against and from any and all losses, liabilities, claims, demands, costs, damages or expenses (including attorneys' fees and other expenses of investigating any claims or defending any action), whether based upon or arising under contract, tort (including negligence) or any federal, state, regional, county, municipal or local law or regulation, or otherwise, to which they or either of them may become subject or which either of them may suffer or incur in any way caused by or arising directly or indirectly from or in connection with:

(a) any breach of any representation, warranty, covenant or obligation of EBI contained herein or in the officers' certificate to be delivered pursuant to paragraph (g) of section 5.01 and those contained in the opinion of the attorneys for EBI to be delivered pursuant to paragraph (f) of section 5.01;

(b) (i) any taxes accruing during the period from January 11, 1985 to October 1, 1985 payable by Copper Range or the Subsidiary, or (ii) the Excluded Assets or RMGC, including, without limitation, the Ordrich Litigation, tax liabilities with respect to the Excluded Assets or RMGC, or the divestiture of the Excluded Assets by Copper Range; or

(c) any employee benefits accruing during the period from January 11, 1985 to October 1, 1985, payable by Copper Range or the Subsidiary, or any Severance Obligation,

provided, however, that, except in respect of a claim pursuant to paragraph (b) of this section 6.01, in no event shall the liability of EBI hereunder exceed in aggregate the sum of $23,700,000. Any claim against EBI hereunder, except a claim pursuant to paragraph (b) of this section 6.01, shall, when liquidated, whether by agreement between NCC and EBI or after final adjudication by a court of competent jurisdiction, be applied first against any balance owing under the Silver Agreement in order of the maturity of the payments coming due thereunder. Any claim against EBI pursuant to paragraph (b) of this section 6.01 shall, when liquidated, whether by agreement between NCC and EBI or after final adjudication by a competent jurisdiction, be paid in cash. In addition, claims for indemnity, except a claim pursuant to paragraph (b) of this section 6.01, shall be further limited as follows:

(d) no claim for breach of representation or warranty shall be made or sought to be enforced against EBI in respect of any asset of group of assets if Copper Range owns any other asset which is surplus to its needs for the White Pine mine and which can reasonably be substituted for the asset which would otherwise be the subject of a claim for indemnity hereunder;

(e) no claim for breach of representation or warranty shall be made or sought to be enforced against EBI in respect of any defect of title to any asset which is not reasonably necessary for and utilized in the mining and processing operation of the White Pine Division; and

(f) no claim for breach of representation or warranty shall be made or sought to be enforced against EBI unless and until the aggregate of any such claims equals or exceeds $50,000, in which case NCC may from time to time claim the aggregate of such claims.

Section 6.02 Indemnification by NCC

Without in any way derogating from the covenants, conditions, representations and warranties herein contained, NCC, Copper Range and the Subsidiary shall indemnify and save EBI, and each director, officer, employee or agent thereof, harmless against and from any and all losses, liabilities, claims, demands, costs, damages or expenses (including attorneys' fees and other expenses of investigating any claims or defending any action), whether based upon or arising under contract, tort (including negligence) or any federal, state, regional, county, municipal or local law or regulation, or otherwise, to which they or either of them may become subject or which either of them may suffer or incur in any way caused by or arising directly or indirectly from or in connection with:

(a) any breach of any representation, warranty, covenant or obligation of NCC contained herein or in the opinion of the attorneys for NCC to be delivered pursuant to paragraph (c) of section 5.02;

(b) liabilities of Copper Range or the Subsidiary incurred on or after the Closing or as a result of activities of the directors, officers, employees or agents of NCC prior thereto while NCC was preparing the White Pine mine site for recommencement of operations;

(c) the conduct of the business of Copper Range or the Subsidiary, including, without limitation, creation of the intended employee stock ownership plan, on or after the Closing; and

(d) liabilities of Copper Range or the Subsidiary incurred at or prior to the Closing that remain liabilities of Copper Range or the Subsidiary immediately after the Closing, except those liabilities with respect to which EBI has agreed to indemnify NCC or Copper Range hereunder.

The foregoing notwithstanding, no claim for breach of representation or warranty therefor shall be made or sought to be enforced against NCC unless and until the aggregate of any such claims equals or exceeds $50,000, in which case EBI may from time to time claim the aggregate of such claims.

Section 6.03 **Mechanism for Claims**

In the event either EBI or NCC (the "Claimant") desires to make an indemnity claim against the other (the "Indemnitor") under the provisions of this agreement the Claimant shall give prompt written notice to the Indemnitor of the institution of any actions, suits or proceedings and demands at any time instituted against or made upon the Claimant or any state of facts known to the Claimant in connection with which the Claimant would claim indemnification hereunder, and the Claimant shall, at the time of giving such notice, if the Indemnitor shall agree that it would have responsibility to indemnify hereunder, give the Indemnitor full authority to defend, adjust, compromise or settle the action, suit, proceeding or demand of which such notice shall have been given, in the name of the Claimant or otherwise as the Indemnitor shall elect; provided, however, that the Claimant may, at its own expense, retain such additional attorneys as it may deem necessary, which attorneys will be permitted by the Indemnitor and its attorneys to observe or participate in all aspects of the defense of such action. The Indemnitor shall have the right, after consultation with the Claimant, to resolve and settle any such claims or actions which result only in the payment of money damages by the Indemnitor, unless the Claimant determines that such settlement would not be in its best interests, in which event the Claimant may, at its own expense, defend such claims or disputes and shall promptly release the Indemnitor from any and all liability with respect thereto in excess of the amount of any payment which the Claimant and the Indemnitor reasonably determine would have been required to be made by the Indemnitor in connection with such settlement.

In the event of any claims for indemnification under this agreement, the Claimant shall advise the Indemnitor in writing of the amount and circumstances surrounding said claim. With respect to liquidated claims, if within 30 days the Indemnitor has not contested said claim in writing, the Indemnitor will pay the full amount thereof in cash within 10 days after the expiration of such period. Each party shall be responsible for its own expenses in any arbitration or litigation between the parties hereto, and any expenses not attributable to either party, such as the cost of a third arbitrator (in the event that the parties agree to arbitration) shall be shared equally by the parties.

Nothing contained in this section 6.03 shall apply to the Ordrich Litigation, it being understood that such matter shall be solely in the absolute control and direction of EBI so long as EBI is meeting its obligation to fully indemnify NCC and Copper Range in respect thereof.

ARTICLE VII

CLOSING

Section 7.01 <u>Time and Place</u>

The purchase and sale of the Capital Stock provided for by this agreement shall be closed at 0900 hours local time on the Closing Date in the Republic Plaza Building offices of Davis, Graham & Stubbs, Denver, Colorado.

Section 7.02 <u>Delivery of Endorsed Certificate</u>

At the Closing there will be delivered to NCC, subject to the terms of this agreement, a certificate representing Capital Stock duly endorsed on a separate stock power for transfer to NCC.

Section 7.03 <u>Delivery of Other Documents by EBI</u>

The following will also be delivered or caused to be delivered at the Closing to NCC by EBI:

(a) resignations of all directors and officers of Copper Range and the Subsidiary as specified in paragraph (d) of section 5.01;

(b) opinion of EBI's attorneys as specified in paragraph (f) of section 5.01;

(c) certificate to be executed by the President and Senior Vice-President, Finance of EBI as specified in paragraph (g) of section 5.01;

(d) certificate of the appropriate corporate secretary setting forth resolutions of the board of directors of EBI authorizing the transfer of the Capital Stock and of Copper Range and the Subsidiary respectively accepting the resignations of the present directors and officers of Copper Range and the Subsidiary as specified in paragraph (j) of section 5.01;

(e) constructive delivery to NCC all of the books, journals, ledgers, files, records, title documents, deeds and contracts, including the minute books, seals and other corporate records, of Copper Range relating to the Copper Assets and the Subsidiary as specified in paragraph (k) of section 5.01; and

(f) two executed copies of each of the LL&E Agreement, Lease Agreement and Silver Agreement and the documents contemplated thereby.

Section 7.04 **Deliveries of Documents by NCC**

The following will be delivered or caused to be delivered at the Closing to EBI by NCC:

(a) bank draft for $3,700,000 plus any amount required for adjustments and the Silver Agreement acknowledging NCC's and Copper Range's indebtedness to EBI for the $20,000,000 balance of the Purchase Price, all as specified in section 2.01;

(b) opinion of NCC's attorneys as specified in paragraph (c) of section 5.02;

(c) evidence satisfactory to EBI of a formal labour agreement to permit commencement of operations as specified in paragraph (d) of section 5.02; and

(d) two executed copies of the LL&E Agreement, Lease Amendment and Silver Agreement and the documents contemplated thereby as specified, in part, in paragraph (f) of section 5.02.

ARTICLE VIII

NOTICES

Section 8.01 **Form of Notice**

Any notice, direction or other communication or instrument required or permitted to be given or delivered under the provisions of this agreement shall be in writing and shall be given by personal delivery to the individual indicated below or his successor in office or by sending by telex or telecopy in each case addressed as follows:

(a) to EBI:

Echo Bay Inc.
c/o Echo Bay Mines Ltd.
3300 ManuLife Place
10180 - 101 Street
Edmonton, Alberta
CANADA
T5J 3S4

Attention: Richard C. Kraus,
Senior Vice-President, Finance

Telex number: 037-41510; ECHO BAY EDM
Telecopy number: (403) 429-5869

(b) to NCC and Copper Range:

Northern Copper Corporation
c/o Mine Management Resources, Inc.
2207 Jackson Street
Golden, Colorado 80401

Attention: Russell L. Wood,
President

Telecopy number: (303) 295-3040

Any such notice, direction or other communication or instrument so delivered or given shall be conclusively deemed to have been given when delivered if delivered personally, or the next business day following the sending of same if given by telex or telecopy provided that an originally signed copy of the notice, direction or other communication or instrument is mailed, postage prepaid, to the party addressed as set forth above on the same day that the notice is telexed or telecopied.

Section 8.02 <u>Change of Notice Particulars</u>

Each of the parties hereto shall be entitled to specify a different address, individual or telex or telecopy number of giving written notice as aforesaid to the others.

ARTICLE IX

GENERAL

Section 9.01 Assignment

This agreement is not assignable by any of the parties hereto unless prior written consent thereto is given by the other parties hereto, which consent shall not be unreasonably withheld.

Section 9.02 Benefit and Binding Nature

This agreement shall enure to the benefit of the parties hereto and shall be binding upon the parties hereto and their respective successors and permitted assigns.

Section 9.03 Further Assurances

Each of the parties to this agreement shall make, do and execute or cause to be made, done and executed all such further and other things, acts, deeds, documents, conveyances and assurances as may be necessary or reasonably required to carry out the intent and purpose of this agreement fully and effectually, including, without limitation, the transfer of the Excluded Assets to EBI's affiliates at its direction insofar as the transfer thereof may not have been perfected prior to the Closing Date.

IN WITNESS WHEREOF the parties hereto have each caused this agreement to be duly executed and delivered by their authorized officers as of the date first written above.

Attest:	ECHO BAY INC.
Ronald J. Simpson Ronald J. Simpson, Assistant-Secretary	PER: Richard C Kraus Richard C. Kraus, Senior Vice-President Finance

Attest:

Michael D. Dunn
Secretary,

NORTHERN COPPER CORPORATION

PER: Russell L. Wood
Russell L. Wood,
President

Attest:

Ronald J. Simpson
Ronald J. Simpson
Assistnat-Secretary

COPPER RANGE COMPANY

PER: Richard C. Kraus
Richard C. Kraus,
Senior Vice-President
Finance

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SCHEDULE 3
SILVER AGREEMENT

SILVER AGREEMENT

This agreement has been entered into as of October 1, 1985.

AMONG:

ECHO BAY INC.,
a corporation incorporated under the laws of the State of Delaware with its principal place of business in Denver, Colorado ("EBI")

and

NORTHERN COPPER CORPORATION,
a corporation incorporated under the laws of the State of Michigan with its principal place of business in White Pine, Michigan ("NCC")

and

COPPER RANGE COMPANY,
a company incorporated under the laws of the State of Michigan with its principal place of business in Reno, Nevada ("Copper Range")

WHEREAS EBI, NCC and Copper Range entered into an agreement dated as of the date hereof whereby EBI agreed to sell to NCC and NCC agreed to purchase all of the authorized, issued and outstanding shares of Copper Range;

AND WHEREAS pursuant to section 2.01 of that agreement EBI, NCC and Copper Range are obliged to enter into this agreement;

NOW THEREFORE in consideration of the aforementioned obligation, of these premises and of the covenants and agreements herein contained EBI, NCC and Copper Range covenant and agree as set forth below.

ARTICLE 1

INTERPRETATION

1.1 Definitions

1.1.1 "Closing Date" means the closing date as defined in the Share Sale and Purchase Agreement.

1.1.2 "Comex" means Commodity Exchange, Inc., a corporation having an office at Four, World Trade Centre, New York, New York.

1.1.3 "Event of Default" means an event specified in Section 7.1

1.1.4 "Ounce of Silver" means a fine ounce troy weight of silver of a minimum fineness of .999 readily tradeable through Comex.

1.1.5 "Outstanding Silver Principal" means at any time the number of ounces of silver of the Silver Principal then outstanding.

1.1.6 "Refinery Lease" means the refinery lease relating to the White Pine Refinery entered into effective as of January 1, 1985 between White Pine Leasing, Inc. and Copper Range as amended by an amending agreement effective as of October 1, 1985, but does not include the option to purchase provided for therein.

1.1.7 "Royal Bank Loan" means the loan by The Royal Bank of Canada to NCC and Copper Range of the principal sum of $1,250,000 plus interest and any expenses incurred thereunder, the repayment of which is guaranteed by EBI.

1.1.8 "Security" means the

1.1.8.1 mortgage and security agreement substantially in the form attached hereto as Schedule "A" charging and creating a security interest prior to all other security and third party interests whatsoever, in all of the assets of Copper Range with the exception of:

1.1.8.1.1 copper and non-copper bearing inventories, and

1.1.8.1.2 the wage and salary escrow fund; including a mortgage on the leasehold interest of Copper Range in the lease with Amax Exploration, Inc. dated July 1, 1984 and in the leasehold interest of Copper Range in the Refinery Lease; and

1.1.8.2 security agreement in substantially the form attached hereto as Schedule "B" charging and creating a co-equal first security interest with Philipp Brothers, Inc. prior to all other security and third party interests except for the interest of Philipp Brothers, Inc. created on the date hereof, in

1.1.8.2.1 copper bearing inventories, and

1.1.8.2.2 the wage and salary escrow fund of Copper Range.

1.1.9 "Share Sale and Purchase Agreement" means the agreement entered into as of October 1, 1985 among EBI, NCC and Copper Range whereby EBI agreed to sell to NCC and NCC agreed to purchase all of the authorized, issued and outstanding shares of Copper Range.

1.1.10 "Silver Interest" means interest at the rate of 8.0% per annum denominated in ounces of silver on the Outstanding Silver Principal computed and payable in accordance with articles 2 and 3.

1.1.11 "Silver Principal" means that number of ounces of silver determined on the Closing Date in accordance with the following formula

$$SP = \frac{20,000,000}{acp}$$

where SP is the Silver Principal and acp is the daily Comex closing spot price per ounce of silver of a fineness of .999 average for the month of October, 1985

1.2 Headings

The division of this agreement into articles and sections and the insertion of headings is for convenience of reference only and shall not affect the construction or interpretation hereof. Unless otherwise stated, all references herein to articles or sections are to those in this agreement. Words such as "herein", "hereof", "hereby" and "hereunder" and similar expressions are references to this agreement and not to specific articles or sections unless otherwise stated.

1.3 Plurality and Gender

Words importing the singular number only shall include the plural and vice versa and word importing the masculine gender shall include the feminine gender and words importing individuals shall include firms and corporations and vice versa.

1.4 Currency

All references in this agreement to dollars and cents are to lawful currency of the United States of America.

1.5 Governing Law

This agreement shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws of the State of Colorado. All parties hereto irrevocably submit to the jurisdiction of any Colorado state or federal court sitting in Denver, Colorado over any action or proceeding arising out of or relating to this agreement and the parties hereto irrevocably agree that all claims in respect of such action or proceeding may be heard and determined in such Colorado state or federal court. The parties hereto also irrevocably consent to the service of any and all process in any such action or proceeding by the mailing of copies of such process to the relevant party at the address specified in section 9.6. The parties agree that a final judgment in any such action or proceeding, after all appeals are exhausted, shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law. Nothing in this section 1.5 shall affect the right of EBI or of NCC or Copper Range to serve legal process in any other manner permitted by law or affect the right of any of them to bring an action or proceeding against any of the other parties or their property in the courts of any other jurisdiction.

1.6 Time of Essence

Time shall be of the essence of this agreement.

1.7 Acknowledgment

NCC and Copper Range acknowledge and covenant that on the Closing Date Copper Range (a Michigan corporation) will merge with Copper Range Company, a newly incorporated Delaware corporation, with the Delaware corporation being the survivor, and that NCC will then merge with the survivor thereby forming a single corporation with Copper Range Company, a Delaware corporation, being the survivor. Since the mergers may not be completed by the completion of the closing of the transactions contemplated in the Share Sale and Purchase Agreement on the Closing Date, NCC and Copper Range hereby agree that:

1.7.1 they will both diligently prosecute all actions necessary to complete the mergers in a timely manner,

1.7.2 until the mergers are completed NCC and Copper Range shall continue to be bound by all of their respective obligations herein, the Security and any instruments or agreements delivered pursuant hereto or thereto, and

1.7.3 upon completion of the mergers the surviving corporation shall be bound by all of the obligations of both NCC and Copper Range herein, the Security and any instruments or agreements delivered pursuant hereto or thereto.

Upon completion of the mergers all references herein to NCC or Copper Range shall, henceforth, mean the surviving corporation resulting from such mergers.

ARTICLE 2

PAYMENT

2.1 Acknowledgment of Silver Indebtedness

NCC hereby acknowledges itself indebted to EBI for the full amount of the Silver Principal and Silver Interest and promises to pay the full amount of the Outstanding Silver Principal and Silver Interest on or before April 1, 1993, subject to article 3, in accordance with the terms hereof.

2.2 Acknowledgment of Other Indebtedness

In the event that EBI makes any payments or incurs any costs as a result of the default by NCC or Copper Range under the terms of the Refinery Lease or the Royal Bank Loan, NCC or Copper Range or both, as the case may be, acknowledge themselves indebted to EBI for the full amount of such payments plus any and all consequential or ancillary costs related thereto including, without limiting the generality of the foregoing, legal and accounting fees. NCC or Copper Range or both, as the case may be, promise to pay forthwith to EBI the full amount of such payments and costs. NCC and Copper Range also agree to pay on demand all costs and expenses in connection with EBI's post default enforcement of the terms of this agreement and the Security. From the time such payments, costs and expenses are made or incurred by EBI until they are paid in full, whether before or after demand for payment, the obligation to pay shall be additional indebtedness secured by the Security. NCC and Copper Range shall pay any and all stamp and other taxes payable or determined to be payable, except for any income taxes of EBI, in connection with the execution and delivery of this agreement, and they agree to save EBI harmless from and against any and all liabilities with respect to or resulting from any delay by NCC or Copper Range in paying or omission to pay such taxes.

<u>2.3</u> <u>Payment of Silver Principal and Silver Interest</u>

NCC agrees to pay to EBI the Silver Principal and Silver Interest, subject to article 3, by 24 blended payments as follows:

2.3.1 the payments shall be made commencing on the first day of July, 1986 and thereafter on the first day of the month, one at a time, 3 months after the previous payment until the twenty-fourth such payment is made on the first day of April, 1992, the amount of each such payment being determined in accordance with the following formula:

$$P = Y\ (\text{Silver Principal} + Z) \times .052871$$

where P is the amount of each payment expressed in dollars,

Y is the daily Comex closing spot price of silver averaged over the 3 month period prior to such payment date, and Z is (Silver Principal x .0404), representing Silver Interest from October 1, 1985 to March 31, 1986.

2.3.2 In the event a payment is made which is less than the blended payment required herein, the said payment when received shall be applied firstly as to Silver Interest and the balance on account of reduction of the Outstanding Silver Principal.

2.4 Interest on Outstanding Payments

2.4.1 Outstanding Silver Principal shall bear interest from the Closing Date until fully paid, calculated as herein before provided, 2.4.2 all payments and costs described in section 2.2 shall bear interest at the rate of 8.0% per annum from the date made or incurred by EBI until paid,

2.4.3 in the event all or any portion of a blended payment referred to in section 2.3 is not made on or before its due date, whether deferred in accordance with article 3 or otherwise, such blended payment shall be calculated in dollars on its due date pursuant to section 2.3 and the amount of such blended payment shall accrue interest at the rate of 8.0% per annum calculated from that due date until paid, and to the extent permitted by law, compounded and computed every 3 months and paid on demand.

2.5 Manner of Payment

All payments hereunder shall be by direct wire transfer to the credit of EBI at The Royal Bank and Trust Company, 68 William Street, New York, New York, account no. 073-3071, or to such other bank or account as EBI may from time to time designate.

ARTICLE 3

DEFERRED PAYMENTS AND PREPAYMENTS

3.1 Definitions

For purposes of this article, the defined terms shall have the meanings set out in Schedule "C" hereto

3.2 Right to Defer Payments

NCC shall make blended payments to EBI on the Payment Dates for the preceeding Period, provided however, NCC may at any time and from time to time, defer up to 4 blended payments or portions thereof referred to in section 2.3, not more than 2 of which may be consecutive. If NCC intends to defer a blended payment it must notify EBI prior to the relevant Payment Date and the following 2 conditions must exist in order for NCC to defer such payment:

3.2.1 the daily Comex closing spot price of copper averaged over the Period since the previous Calculation Date is less than $0.76 per pound; and

3.2.2 Available Cash Flow with respect to the Period is not sufficient to pay Scheduled Payments.

Along with such notice, NCC shall provide a certificate of its Chief Financial Officer, certifying that both conditions as stated in this section 3.2 have been met and the calculation of Available Cash Flow and Free Cash Flow attached to the notice are correct.

3.3 Payment Priority

If Available Cash Flow is not sufficient to pay all Schedule Payments, NCC will make payments from Available Cash Flow, to the extent available

3.3.1 first, to regularly scheduled payments under the $2,000,000 loan to NCC and Copper Range by Philipp Brothers, Inc. and allowable and due deferrals thereunder,

3.3.2 second, pro rata to regularly scheduled payments and allowable and due deferrals under the loans and agreements identified in sections 3.2, 3.3, 3.4 and 3.6 of Schedule "C",

3.3.3 third, to the State of Michigan or agencies or subdivisions thereof under the 3 separate loans referenced in Section 3.5 of Schedule "C" on a pro rata basis, provided however, if the Refinery Lease is renewed after the initial scheduled term, then rental payments thereunder will take priority over all other payments referred to in sections 3.1 to 3.5 of Schedule "C".

3.4 Schedule of Payment of Deferrals

In the even that NCC shall have deferred all or any portion of one or more blended payments in accordance with 3.2., the blended payment deferred on the earliest Payment Date plus accrued interest shall be rescheduled and become due and payable to EBI 3 months after the last blended payment is made under section 2.3.1 and the blended payment deferred on the next earliest Payment Date plus accrued interest shall be rescheduled and become due and payable 3 months after the previous such payment, and so on until all deferred payments and all accrued interest have been paid in full not later than April 1, 1993.

3.5 Prepayments

In the event that there is at any time Free Cash Flow and Outstanding Silver Principal, Silver Interest or any other indebtedness of NCC or Copper Range to EBI hereunder, such Free Cash Flow will be allocated and paid to the extent available

3.5.1 to prepay the $2,000,000 loan to NCC and Copper Range from Philipp Brothers, Inc., until fully paid,

3.5.2 then the remainder as follows:

3.5.2.1 30% thereof as a wage supplement to the hourly employees of Copper Range,

3.5.2.2 5% thereof as a salary supplement of the management employees of Copper Range,

3.5.2.3 65% thereof pro rata between EBI for any indebtedness hereunder and the Michigan Strategic Fund for its loan to NCC and Copper Range, provided that if all indebtedness to EBI hereunder and to the Michigan Strategic Fund has been paid, then such 65% to the Ontonagon County Economic Development Corporation for its loans to NCC and Copper Range.

Each partial prepayment to EBI shall be applied to the blended payments set out in section 2.3 in the inverse order of their maturity. The prepayment shall be calculated in ounces of silver on the date of prepayment in accordance with the following formula:

$$\frac{R}{Y} = T$$

where R is the dollar amount of the prepayment

Y is the daily Comex closing spot price of silver averaged over the 3 month period prior to such payment date, and

T is the number of ounces of silver prepaid.

Following each such prepayment, the remaining blended payments otherwise calculated in accordance with section 2.3.1 shall be re-calculated to determine reduced blended payments after giving effect to the prepayment by deducting the amount of the prepayment in ounces of silver from Outstanding Silver Principal.

ARTICLE 4

SECURITY

4.1 Nature of Security

The obligations of NCC and Copper Range to pay to EBI the Silver Principal and Silver Interest and all other payments hereunder shall be secured by the security interests in the property being charged by the Security.

4.2 Form and Registration of Security

The Security shall be provided by NCC and Copper Range and shall be perfected by recording and filing in such jurisdictions as EBI may from time to time reasonably require, at the expense of NCC and Copper Range.

4.3 General

Nothing herein contained or in the Security, nor any act or omission of EBI with respect to the Security, shall in any way prejudice or affect the rights, remedies or powers of EBI with respect to any other rights, remedies or powers of EBI at any time in relation to NCC or Copper Range.

ARTICLE 5

REPRESENTATIONS AND WARRANTIES

5.1 Representations and Warranties of NCC

NCC hereby represents and warrants to EBI as of the Closing Date as follows:

5.1.1 NCC has been duly incorporated and is validly existing as a corporation under the laws of Michigan, is duly qualified to carry on its business in each jurisdiction in which it carries on business, has the power and authority to enter into and perform its obligations under this agreement, the Security and all instruments and agreements delivered pursuant hereto and thereto and to own its property and carry on its business as currently conducted;

5.1.2 the execution, delivery and performance of this agreement, the Security and every instrument or agreement delivered pursuant hereto and thereto has been duly authorized by all requisite action and this agreement, the Security and all instruments and agreements delivered pursuant hereto and thereto have been duly executed and delivered by the NCC and constitute valid and binding obligations of NCC enforceable against NCC in accordance with their terms;

5.1.3 to the best knowledge of NCC there are no actions, suits or proceedings pending or threatened against or affecting NCC at law or in equity or before or by any governmental department, commission, board, bureau, agency or instrumentality, domestic or foreign, or before any arbitrator of any kind, which would result in any material adverse change in business, operations, prospects, properties or assets, or condition, financial or otherwise, or in its abilities to perform its obligations under this agreement, the Security or any instrument or agreement delivered pursuant hereto or thereto;

5.1.4 NCC is not a party to any agreement or instrument which materially affects its business, operations, prospects, properties, assets or condition, financial or otherwise, except as set forth in Schedule "D";

5.1.5 NCC is not subject to any restriction or any judgment, order, writ, injunction, decree, award, rule or regulation which materially adversely affects or in the future may materially adversely affect its business, operations, prospects, properties, assets or condition, financial or otherwise;

5.1.6 NCC is not in default beyond any period of grace with respect thereto under any guarantee, bond, debenture, note or other instrument evidencing any indebtedness or under the terms of any instrument pursuant to which any of the foregoing has been issued or made and delivered;

5.1.7 no statement or report furnished to EBI by or on behalf of NCC in connection with the negotiation or confirmation of the transactions contemplated herein contain, as at the time such statements were furnished, any untrue statement of a material fact or any omission of a material fact necessary to make the statements contained therein not misleading, and all such statements, taken as a whole together with this agreement, the Security and any instruments or agreements delivered pursuant hereto or thereto do not contain any untrue statement of a material fact or omit a material fact necessary to make such statements not misleading;

5.1.8 to the best knowledge of NCC after reasonable inquiry there is no fact which has not been disclosed to EBI in writing which materially adversely affects, or so far as NCC can now reasonably foresee, will materially adversely affect the assets, liabilities, affairs, business, prospects, operations or conditions, financial or otherwise, of NCC or its abilities to perform its obligations under this agreement, the Security or any instruments or agreements delivered pursuant hereto or thereto;

5.1.9 none of the execution nor delivery of this agreement, the Security or any instruments or agreements delivered pursuant hereto or thereto, the consummation of the transactions herein and therein contemplated, nor compliance with the terms, conditions and provisions hereof or thereof conflicts with or will conflict with, or results or will result in any breach of, or constitutes a default under any of the provisions of the constating documents of NCC or of any agreements or instruments to which it is a party or by which its property and assets are bound or, except as contemplated herein or in the Security, results or will result in the creation or imposition of any mortgage, lien, charge or encumbrance of any nature whatsoever upon any of its properties or assets or in the contravention of any applicable law, rule or regulation;

5.1.10 other than compliance with the expiration of the application waiting period pursuant to the provisions of the Hart-Scott-Rodino Act no consent, approval or authorization of, or declaration, registration, filing or qualification with, or giving of notice to, or taking of any other action in respect of, any governmental authority or agency on the part of NCC is required in connection with the execution and delivery of this agreement, the Security or any instruments or agreements delivered pursuant hereto or thereto or the consummation of any of the transactions contemplated hereby or thereby;

5.1.11 no event has occurred which constitutes or, with notice or lapse of time or both, would constitute an Event of Default;

5.1.12 NCC is authorized to issue 100,000,000 common and 10,000,000 preferred shares, par value $.001 each, of which 20 common shares are presently issued and are outstanding and the registered and beneficial owners of such outstanding shares are as follows: Russell L. Wood and Eldon D. Kirsch.

ARTICLE 6

COVENANTS

6.1 Affirmative Covenants

NCC and Copper Range covenant and agree with EBI that, so long as this agreement is in force and except as otherwise permitted by the prior consent of EBI, they will:

6.1.1 do or cause to be done all things necessary to cause the mergers described in section 1.7 forthwith on the Closing Date or so soon thereafter as is possible, and to keep in full force and effect the corporate existence of the surviving corporation and all properties, rights, franchises, licenses and qualifications necessary to carry on its business in each jurisdiction in which they own property or carry on business from time to time;

6.1.2 maintain insurance of such types, in such amounts and against such risks as is customary in the case of companies engaged in a similar business, together with all mortgage and loss payable clauses as reasonably specified by EBI with respect to the assets charged by the Security, with insurers and in form and substance reasonably satisfactory to EBI; and provided certified copies of such insurance policies as specified by EBI;

6.1.3 comply with all applicable laws, regulations, rules and governmental restrictions and obtain and maintain in good standing all licenses, permits and approvals from any and all governments, governmental commissions, boards or agencies of jurisdictions in which they carry on business required in respect of their operations, provided however, if either NCC or Copper Range become aware of any non-compliance or alleged non-compliance with the terms of this section 6.1.3, NCC or Copper Range as the case may be, shall either comply or commence compliance within 90 days of such awareness and thereafter diligently prosecute such efforts and NCC or Copper Range shall be entitled to contest in good faith any alleged non-compliance or the validity or applicability of any law, regulation, rule or governmental restriction;

6.1.4 pay or cause to be paid all taxes, government fees and dues levied, assessed or imposed upon them and their property or any party thereof, as and when the same become due and payable, unless any such taxes, fees, dues, levies, assessments or imposts are in good faith contested by them or do not in the aggregate materially adversely affect their financial condition, or their ability to carry on their business;

6.1.5 deliver to EBI as soon as practicable and in any event within 120 days after the end of each of their fiscal years, the audited financial statements of NCC and Copper Range, consisting of at least a balance sheet, statement of changes in financial position and statements of earnings and retained earnings together with detailed comparative figures for the previous fiscal year where applicable, the applicable auditor's report and opinion (such auditors to be a firm of independent chartered accountants or certified public accountants of recognized standing acceptable to EBI);

6.1.6 deliver to EBI in each year as soon as practicable and in any event within 45 days after the end of each of their first 3 fiscal quarters, their interim unaudited financial statements as at the end of such quarter, consisting of at least a balance sheet and earnings statement, certified to be correct to the best of his knowledge, information and belief by their chief financial officers;

6.1.7 deliver to EBI as soon as practicable and in any event within 120 days after the end of each fiscal year, a report by their auditors to the effect that they have reviewed in accordance with appropriate professional standards the quarterly computations of Available Cash Flow and Free Cash Flow and that such computations have been properly prepared and do not appear to have been materially mis-stated.

6.1.8 within 20 days after the end of each month, deliver copies of the balance sheet of NCC and Copper Range and their subsidiaries as of the end of such month, statements of income and retained earnings for the period and cash flow statements from the beginning of the fiscal year to the end of such month, in each case certified by the Chief Financial Officer.

6.1.9 deliver or cause to be delivered to EBI on a confidential basis such other information relating to the conduct of their business and affairs as EBI may reasonably request, and permit any person designated by EBI at EBI's expense, after reasonable notice, to visit and inspect during regular business hours any of their properties, to examine their corporate books and financial records and to discuss their affairs, finances and accounts all at such reasonable times and as often as may be reasonably requested, provided however, any such visit or inspection shall be at the sole risk of EBI and EBI will indemnify and hold harmless

NCC, Copper Range, their directors, officers, employees and agents for any loss, damage, liability, claim or action incurred as a result of such visit or inspection except for,

6.1.9.1 the negligent or wilful acts of NCC or Copper Range or its contractors, agents, employees, officers or directors, and

6.1.9.2 consequences arising from information determined as a result of such visit or inspection;

6.1.10 forthwith notify EBI of the occurrence of any Event of Default or any event which with notice or lapse of time or both would constitute an Event of Default;

6.1.11 forthwith upon the mergers described in section 1.7 deliver to EBI a copy of the certificates of merger and copies of the merger agreements and constating documents of the surviving corporation, certified to be true and correct by the Secretary of the surviving corporation;

6.1.12 upon execution hereof, execute and deliver the Security and cause filing and recording in all appropriate offices in order that the Security will constitute a charge on the assets therein described, in the priority specified in section 1.1.9.

6.2 <u>Negative Covenants</u>

Except as permitted by any other agreement herein referred to or contemplated or necessitated by the transactions herein identified, and except as otherwise permitted by the prior consent of EBI, which consent will not be unreasonably withheld, NCC and Copper Range covenant and agree with EBI that, so long as this agreement is in force, they will not:

6.2.1 other than by the Security, create or permit to exist any mortgage, hypothec, pledge, charge, lien or other encumbrance upon any of the assets, shares, property or undertaking being charged by the Security, except for inchoate liens and the permitted encumbrances as detailed in the Security;

6.2.2 guarantee any future debt or obligation of any person or entity except as between NCC and Copper Range and set out in the

Security and except those obligations to Copper Range's employee stock ownership plan (the "ESOP") set forth in such plan, the Copper Range Employee Stock Ownership Trust Agreement, the Loan Agreement dated November 7, 1985 between the ESOP and Copper Range or the Stock Purchase Agreement dated November 7, 1985 between the ESOP and Copper Range;

6.2.3 sell, lease, assign, transfer or otherwise dispose of, other than the inventory of Copper Range in the ordinary course of its business, any material assets of NCC or Copper Range whether now owned or hereafter acquired;

6.2.4 enter into any merger or consolidation with any other firm or corporation other than as herein specifically contemplated; and

6.2.5 pay any dividends, or repurchase or redeem any share now issued and outstanding except for the shares owned by the ESOP the redemption of which is now contemplated, or the redemption of stock issued to management pursuant to the Stock Agreements dated November 7, 1985 between Copper Range and certain of the management shareholders of Copper Range, or otherwise make a reduction of their capital.

ARTICLE 7

EVENTS OF DEFAULT

7.1 Events of Default

Any one or more of the following events shall constitute an Event of Default hereunder:

7.1.1 subject to any applicable deferrals, if NCC or Copper Range fail to make any payment to EBI as provided for herein on the due date and within 5 days after notice thereof has been provided to NCC or Copper Range, as the case may be;

7.1.2 except for the events referred to in section 7.1.1, if NCC or Copper Range default in the performance or observance of any term, condition, representation or covenant contained in this agreement, the Security or any of the instruments or agreements delivered pursuant hereto or thereto and such default continues for a period of 30 days or more after notice thereof has been given by EBI to NCC, or Copper Range, as the case may be, or if the correction of the default is not commenced within such 30 day period and prosecuted diligently thereafter;

7.1.3 if any representation or warranty made by NCC or Copper Range in this agreement, the Security or any of the instruments or agreements or any certificate or other document delivered to EBI pursuant hereto or thereto, is untrue or incorrect in any material respect;

7.1.4 if the Security, or any part thereof, ceases at any time after its execution and delivery to constitute in favor of EBI its successors or assigns, a mortgage, charge, pledge, obligation or security interest of the rank and in the manner contemplated by this agreement;

7.1.5 if NCC or Copper Range default in the payment of any obligations or indebtedness (other than to EBI) under the Refinery Lease, the Royal Bank Loan or otherwise, which has become due and payable prior to the expressed maturity thereof and such default continues for a period of 7 days after the permissible cure period has expired;

7.1.6 if an event of default occurs under any of the agreements referred to in section 3.0 of Schedule "C" after any permissible cure periods have expired;

7.1.7 if an order is made or an effective resolution passed for the winding-up, liquidation or dissolution of NCC or Copper Range;

7.1.8 if NCC or Copper Range consent to or make a general assignment for the benefit of creditors or make a proposal or corresponding proceeding under applicable insolvency legislation, or is declared bankrupt, or if a liquidator, trustee in bankruptcy, custodian or receiver or manager or other officer with similar powers is appointed of NCC or Copper Range or of their property or any part thereof and such appointment is either not being contested in good faith or has been contested for a period of more than 90 days by NCC or Copper Range;

7.1.9 if an encumbrancer takes possession of the property of NCC or Copper Range or any part thereof or if a distress or execution or any similar process is levied or enforced against such property and remains unsatisfied for such period as would permit such property or such part thereof to be sold thereunder, provided that such possession or process has not been stayed and is not being contested in good faith by NCC or Copper Range;

7.1.10 if NCC or Copper Range cease or threaten to cease to carry on in the ordinary course their business or a substantial part thereof; or

7.1.11 other than a report for any portion of 1985, if any report of the auditors of NCC or Copper Range contain any qualification which, in the opinion of EBI after due inquiry by EBI, relates to a matter which materially adversely affects the financial conditions or operation of NCC or Copper Range.

7.2 Acceleration

Upon the occurrence of any one or more of the Events of Default, all indebtedness of NCC and Copper Range to EBI hereunder shall, at the option of EBI immediately become due and payable without presentment, demand, protest or other notice of any kind, all of which are expressly waived by NCC and Copper Range (including without limitation that the Outstanding Silver Principal and Silver Interest of which shall thereupon be deemed to be converted to dollars in the same manner as provided in Section 2.3 which shall bear interest at the rate of 8.0% per annum as well after as before maturity, default and judgment, with, to the extent permitted by applicable law, interest on overdue interest), and all collateral and securities shall thereon become enforceable by EBI or its duly authorized agent.

7.3 Remedies Cumulative

The rights and remedies of EBI hereunder are cumulative and in addition to and not in substitution for any rights or remedies permitted by law.

7.4 Non-Merger

The taking of a judgment or judgments or any other action or dealing whatsoever by EBI in respect of any security given by NCC or Copper Range to EBI shall not operate as a merger of any indebtedness or liability of NCC or Copper Range to EBI or in any way suspend payment or affect or prejudice the rights, remedies and powers, legal or equitable, which EBI may have in connection with such liabilities and the surrender, cancellation or any other dealings with any security for such liabilities shall not release or affect the liability of NCC or Copper Range hereunder or any security held by EBI.

ARTICLE 8

CONDITIONS TO SILVER AGREEMENT

8.1 General

NCC shall forthwith deliver to EBI the following documents:

8.1.1 certified copies of all corporate action taken by NCC and Copper Range to authorize the transaction hereunder and the execution and delivery of this agreement and the Security;

8.1.2 executed copies of the Security and all instruments and agreements required thereunder; and

8.1.3 the opinions of solicitors for NCC satisfactory to EBI in substantially the form annexed hereto as Schedule "E".

ARTICLE 9

MISCELLANEOUS

9.1 Legal Fees

NCC and Copper Range agree that EBI may charge on its own behalf and pay to others reasonable sums for expenses incurred and for services rendered (expressly including legal advices and services) in or in connection with maintaining, protecting, realizing, disposing of, retaining or collecting under the Security or any part thereof after an Event of Default, and such sums shall be first charge on the proceeds of realization, disposition or collection.

9.2 Waiver

No waiver or delay on the part of EBI in exercising any right or privilege hereunder and no waiver as to any Event of Default shall operate as a waiver thereof unless made in writing and signed by an authorized officer of EBI. No waiver shall preclude the further or other exercise of EBI of any right, power or privilege hereunder, or extend to or apply to any further Event of Default.

9.3 Further Assurances

NCC and Copper Range shall from time to time forthwith on EBI's request do, make and execute all such financing statements, further assignments, documents, acts, matters and things as may be reasonably required by EBI of or with respect to this agreement or the Security or any part hereof or thereof or as may be reasonably required to give effect to these presents.

9.4 Dealings by EBI

EBI may grant extensions of time and other indulgences, take and give up securities, accept compositions, grant releases and discharges and otherwise deal with NCC and Copper Range, debtors of NCC and Copper Range, sureties and others and with the Security and other securities as EBI may see fit without prejudice to the liability of NCC and Copper Range hereunder or EBI's right to hold and enforce the Security.

9.5 New Payments

All payments by NCC and Copper Range under this agreement shall be made in full without any deduction or withholding (whether in respect of set off, counterclaim, duties, taxes, charges or otherwise whatsoever) unless NCC or Copper Range is prohibited by law from doing so, in which event NCC or Copper Range, as the case may be, shall:

9.5.1 ensure that the deduction or withholding does not exceed the minimum amount legally required;

9.5.2 pay to the relevant taxation or other authorities within the period for payment permitted by applicable law the full amount of the deduction or withholding (including, but without prejudice to the generality of the foregoing, the full amount of any deduction or withholding from any additional amount paid pursuant to this section); and

9.5.3 furnish to EBI, within the period for payment permitted by applicable law, evidence of payment of the relevant taxation or other authorities involved for all amounts deducted or withheld as aforesaid.

9.6 Notices

Any notice, demand, waiver or communication to be given hereunder must be in writing and may be effectively given by delivering the same at the addresses hereinafter set forth or by sending the same by telex or prepaid registered mail to the parties at such addresses. Any notice so mailed shall be deemed to have been received on the third business day next following the mailing thereof provided the postal service is in operation during such time. In the event of disruption or threatened disruption or regular mail service, notices shall be delivered or telexed. Any telex notice shall be deemed to have been received on transmission if confirmed by the sending machine. The addresses of the parties for the purposes hereof shall respectively be:

9.6.1 ECHO BAY, INC.
3300 ManuLife Place
10180 - 101 Street
Edmonton, Alberta
T5J 3S4
Attention: President
Telex: 037-41510

9.6.2 NORTHERN COPPER CORPORATION
Box 1200
White Pine, Michigan 49971

Attention: President

9.6.3 COPPER RANGE COMPANY
Box 1200
White Pine, Michigan 49971

Attention: President

Any party may from time to time notify the other parties hereto, in accordance with the provisions hereof, of any change of address which thereafter, until changed by like notice, shall be the address of such party for all purposes of this agreement.

9.7 Survival

This agreement shall continue in full force and effect so long as any indebtedness or liability is due and payable to EBI in respect of the Silver Principal of Silver Interest or as otherwise provided in this agreement unless it is varied or terminated in writing by the parties hereto and all agreements, representations, warranties and covenants of NCC and Copper Range made herein or in any document delivered by or on behalf of NCC and Copper Range to EBI pursuant to the provisions hereof or otherwise shall be deemed to have been relied on by EBI notwithstanding any investigation heretofore or hereafter made by EBI, EBI's solicitors or any representative of EBI and as so made shall survive the execution of this agreement until repayment in full thereof and all amounts owing to EBI.

9.8 Severability

Any provision in this agreement which is prohibited or unenforceable shall be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof.

9.9 Successors and Assigns

This agreement shall be binding upon and shall inure to the benefit of EBI, NCC and Copper Range and their respective successors and assigns, provided that neither NCC nor Copper Range shall assign any of its rights or obligations hereunder without the prior consent of EBI, which shall not be unreasonably withheld.

IN WITNESS WHEREOF the parties hereto have executed this agreement as of the day and year first above written.

ECHO BAY INC.
Per: ______________________________

NORTHERN COPPER CORPORATION
Per: ______________________________

COPPER RANGE COMPANY
Per: ______________________________

17

AGREEMENT AND PLAN OF MERGER

THIS AGREEMENT AND PLAN OF MERGER is entered into to be effective as of November 7, 1985 between Northern Copper Corporation, a Michigan corporation ("NCC") and Copper Range Company, a Delaware corporation ("CRC"). NCC and CRC are sometimes referred to jointly in this Agreement as the "Constituent Corporations".

WITNESSETH

WHEREAS, NCC is a corporation duly organized and existing under the laws of the State of Michigan, with an authorized capital stock consisting of (a) 100,000,000 shares of common stock, par value $.001 per share, 20 shares of which are issued and outstanding, and (b) 10,000,000 shares of preferred stock, par value $.001 per share, of which no shares are issued and outstanding. Each share of common stock is entitled to one vote on all matters. Prior to and as of the Effective Date, the preferred stock has and had no voting rights;

WHEREAS, CRC is a corporation duly organized and existing under the laws of the State of Delaware, with an authorized capital consisting of (a) 100,000,000 shares of common stock, par value $.001 per share, 1,000 shares of which are issued and outstanding, and (b) 10,000,000 shares of preferred stock, par value $.001 per share, of which no shares are issued and outstanding. Each share of common stock is entitled to one vote on all matters. Prior to and as of the Effective Date, the preferred stock has and had no voting rights.

WHEREAS, the respective Boards of Directors of the Constituent Corporations have by resolution declared it advisable and in the best interest of the respective corporations and their respective shareholders that NCC merge with and into CRC, and that the terms and conditions of such merger and the manner and basis for converting shares of NCC common stock into shares of CRC common stock shall be as follows:

ARTICLE I
Merger

1.01 In accordance with the provisions of this Agreement and Plan of Merger (the "Agreement") and the corporation laws of the States of Delaware and Michigan, NCC shall be merged with and into CRC, which shall be and is herein sometimes referred to as the "Surviving Corporation". Such transaction shall hereinafter be referred to as the "Merger".

ARTICLE II
Effective Date of Merger

2.01 Except as otherwise specifically set forth in this Agreement, the identity, existence, purposes, powers, objectives, franchises, privileges, rights and immunities of CRC shall continue in effect and unimpaired by the Merger, and the corporate franchise, existence and rights of NCC shall be merged into CRC and CRC shall, as the Surviving Corporation, be fully vested therewith. The separate existence and corporate organization of NCC, except insofar as they may be continued by law, shall cease when the Merger shall become effective.

2.02 The Merger provided for in this Agreement shall not become effective until, and shall become effective at 4:00 p.m., White Pine, Michigan time, on November 7, 1985, provided that prior to such date, the following actions shall have been completed:

(a) This Agreement shall have been adopted (i) by the shareholders of NCC in accordance with the requirements of the Michigan Business Corporation Act, and (ii) by the shareholders of CRC in accordance with the requirements of the General Corporation Law of Delaware; and

(b) The procedures specified in the laws of the States of Delaware and Michigan, as amended, to make the Merger effective under such law shall have been complied with. The earliest date on or after 4:00 p.m., White Pine, Michigan time, November 7, 1985, on which the foregoing action shall have been completed shall hereinafter be referred to as the "Effective Date".

ARTICLE III
Certificate of Incorporation; Bylaws; Directors; Officers

3.01 The Certificate of Incorporation of CRC in force on the Effective Date shall remain and be the Certificate of Incorporation of CRC after the Effective Date until the same shall be altered or amended as provided therein or by applicable law.

3.02 The Bylaws of NCC in force on the Effective Date shall become the Bylaws of CRC after the Effective Date until the same shall be altered, repealed or amended according to the provisions of those Bylaws and the Certificate of Incorporation of CRC.

3.03 The directors of NCC immediately prior to the Effective Date shall become and are hereby elected as the directors of the Surviving Corporation, CRC, after the Effective Date until their successors shall have been elected and qualified. Their names are as follows:

Name

Russell L. Wood
Michael D. Dunn
Eldon D. Kirsch
Dallas L. Burkhammer

If on the Effective Date a vacancy shall exist on the Board of Directors of the Surviving Corporation, such vacancy may thereafter be filled in the manner provided by the Bylaws of the Surviving Corporation.

3.04 The officers of CRC immediately prior to the Effective Date shall continue in office as the officers of the Surviving Corporation, CRC, after the Effective Date until their successors shall have been elected. Their names and titles are as follows:

Name of Individual	Position
Russell L. Wood	President
Herman Ponder	Vice President-Technology
Michael D. Dunn	Vice President/Secretary/ Treasurer
Richard F. Mauro	Assistant Secretary

If on the Effective Date a vacancy shall exist in any office of the Surviving Corporation, such vacancy may thereafter be filled in the manner provided by the Bylaws of the Surviving Corporation.

ARTICLE IV
Conversion of NCC Shares

4.01 Each share of common stock of NCC issued and outstanding on the Effective Date and all rights in respect thereof automatically shall be changed and converted on the Effective Date into one fully paid and nonassessable share of the common stock of CRC.

4.02 On the Effective Date, or as soon thereafter as possible, each holder of an outstanding certificate representing common stock of NCC shall be required to surrender the same (duly endorsed if CRC shall so require) to CRC or its duly authorized agent for cancellation, and each such holder, upon such surrender or upon presentment of such certificate or certificates for transfer or reissuance in the ordinary course of business, shall be entitled to receive in exchange therefor a certificate or certificates representing the number of shares of CRC common stock into which the common stock of NCC previously represented by the surrendered certificate or certificates shall have been changed and converted as provided in this Agreement. Until so surrendered or presented, the outstanding certificates which prior to the Effective Date represented common stock of NCC shall be deemed and treated for all corporate purposes to represent the ownership of the number of shares of common stock of CRC as though the surrender or presentment had taken place.

4.03 The shares of CRC common stock deliverable pursuant to the terms and conditions of this Agreement shall bear a legend in the form substantially as follows:

> "The shares represented by this Certificate have not been registered or qualified under federal or state securities laws. The shares may not be offered for sale, sold, pledged or otherwise disposed of unless so registered or qualified or unless an exemption exists, the availability of which is to be confirmed by an opinion of counsel (which opinion and counsel shall both be reasonably satisfactory to the Company).

ARTICLE V
Cancellation of Shares

5.01 On the Effective Date, all of the shares of CRC common stock that are held by NCC shall be cancelled without further action by either Constituent Corporation or the shareholders of either Constituent Corporation. Furthermore, NCC shall surrender to CRC or its duly authorized agent any certificate or certificates representing the shares of CRC cancelled pursuant to this Article V.

ARTICLE VI
Effects of Merger

6.01 Upon the Effective Date:

(a) The Surviving Corporation shall possess all of the rights, privileges, powers, immunities, and franchises, of a public and of a private nature, of each of the Constituent

Corporations. In addition, all property, real, personal and mixed, including all patents, patent applications, trademarks, together with the good will of the business in connection with which said patents or trademarks are used, and all debts due on whatever account, including subscriptions to shares, and all other choses in action, and every other interest of, or belonging to, or due to each or either of the Constituent Corporations shall be taken and deemed to be transferred and vested in the Surviving Corporation, without further act or deed; and the title to all real estate, or any interest therein, vested in either of the Constituent Corporations shall not revert or be in any way impaired by reason of the Merger;

(b) The Surviving Corporation shall be responsible for all of the debts, liabilities, obligations and duties of each of the Constituent Corporations, and all said debts, liabilities, obligations and duties shall attach to the Surviving Corporation and may be enforced against it to the same extent as if said debts, liabilities, obligations and duties had been incurred or contracted by it. The liabilities of the Constituent Corporations or of their respective shareholders, directors or officers, shall not be affected by the Merger. The rights of the creditors of the Constituent Corporations or of any person dealing with the Constituent Corporations shall not be affected by the Merger. All rights of the creditors and liens upon any property of either of the Constituent Corporations shall be preserved and unimpaired, and any action or proceeding pending by or against either of the Constituent Corporations may be prosecuted to judgment the same way as if the Merger had not taken place, which judgment shall bind the Surviving Corporation; and

(c) All corporate acts, plans, policies, contracts, approvals and authorizations of the Constituent Corporations and their respective shareholders, Boards of Directors, committees elected or appointed by their Boards of Directors, officers and agents, which were valid and effective immediately prior to the Effective Date shall be taken for all purposes as the acts, plans, policies, approvals and authorizations of the Surviving Corporation and shall be as effective and binding thereon as the same were with respect to the Constituent Corporations. The then employees, if any, of each of the Constituent Corporations shall become the employees of the Surviving Corporation and shall continue to be entitled to the same rights and benefits which they enjoy as employees of the Constituent Corporations.

6.02 If at any time after the Effective Date the Surviving Corporation shall consider or be advised that any further assignments or assurances in law or other things are necessary or desirable to vest, perfect, confirm, or record in the Surviving Corporation the title to any property or rights of either of the Constituent Corporations acquired or to be acquired by reason of, or as a result of the Merger, then the Constituent Corporations and their proper officers and directors shall execute and deliver all proper deeds, assignments and assurances in law and do all things necessary or proper to vest, perfect or confirm title to such property or rights in the Surviving Corporation, and otherwise to carry out the purposes of this Agreement, and the proper officers and directors of CRC and the proper officers and directors of NCC are fully authorized to take any and all such action.

ARTICLE VII
Obligations of the Constituent Corporations

7.01 Each of the Constituent Corporations shall take or cause to be taken all actions, and do or cause to be done all things, necessary, proper or advisable, under the laws of the States of Delaware and Michigan, to consummate and effect the Merger, subject, however, to the lawful approval of the shareholders of NCC and CRC in accordance with the requirements of the applicable provisions of the laws of Delaware and Michigan and subject further to the terms and provisions set forth in this Agreement.

ARTICLE VIII
Approval of Shareholders

8.01 This Agreement shall be submitted to the shareholders of NCC in the manner provided for in the Michigan Business Corporation Act, and, for the Merger to be effective, must be approved or adopted by the affirmative vote of holders representing not less than seventy-five percent (75%) of the total number of issued and outstanding shares of NCC common stock.

8.02 This Agreement shall be submitted to the shareholders of CRC in the manner provided for in the General Corporation Law of Delaware, and, for the Merger to be effective, must be approved or adopted by the affirmative vote of holders representing not less than seventy-five percent (75%) of the total number of issued and outstanding shares of CRC common stock.

ARTICLE IX
Amendment

At any time before or after approval or adoption by the Constituent Corporations of this Agreement, this Agreement may be amended in matters of form, or supplemented by additional agreements, articles or certificates, as may be determined in the judgment of the Boards of Directors of the Constituent Corporations to be necessary, desirable, or expedient to clarify the intention of the parties to this Agreement or to effect or facilitate the filing, recording or official approval of this Agreement and the Merger, in accordance with the purpose and intent of this Agreement.

IN WITNESS WHEREOF, this Agreement and Plan of Merger has been executed and attested to by the persons indicated below to be effective as of November 7, 1985.

ATTEST:

Michael D. Dunn

Michael D. Dunn, Secretary

COPPER RANGE COMPANY
(a Delaware corporation)

By Russell L. Wood

Russell L. Wood, President

ATTEST:

Michael D. Dunn

Michael D. Dunn, Secretary

NORTHERN COPPER CORPORATION
(a Michigan corporation)

By Russell L. Wood

Russell L. Wood, President

STATE OF Colorado)
) ss.
~~COUNTY~~ City and OF Denver)

On this 7th day of November, 1985, before me personally came Russell L. Wood as President of Copper Range Company, a Delaware corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Fitke

Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and COUNTY OF Denver) ss.

On this 7th day of November, 1985, before me personally came Michael D. Dunn as Secretary of Copper Range Company, a Delaware corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lee Fitte
Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and COUNTY OF Denver) ss.

On this 7th day of November, 1985, before me personally came Russell L. Wood as President of Northern Copper Corporation, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Northern Copper Corporation, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lee Fitte
Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and COUNTY OF Denver) ss.

On this 7th day of November, 1985, before me personally came Michael D. Dunn as Secretary of Northern Copper Corporation, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Northern Copper Corporation, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Notary Public

My Commission Expires:

1-26-78

CERTIFICATE OF MERGER

Pursuant to Section 21.200(707) of the Michigan Business Corporation Act, Northern Copper Corporation, a Michigan corporation (the "Corporation") hereby certifies that the Agreement and Plan of Merger attached hereto as Exhibit A was adopted by the Corporation's Board of Directors and approved by its shareholders in accordance with Sections 701 to 704 of the Michigan Business Corporation Act.

IN WITNESS WHEREOF, this Certificate of Merger has been executed and attested to by the persons indicated below to be effective as of November 7, 1985.

ATTEST:

Michael D. Dunn

Michael D. Dunn, Secretary

NORTHERN COPPER CORPORATION
(a Michigan corporation)

By Russell L. Wood

Russell L. Wood, President

STATE OF Colorado)
) ss.
City and COUNTY OF Denver)

On this 7th day of November, 1985, before me personally came Russell L. Wood, as President, of Northern Copper Corporation, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Northern Copper Corporation, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Ftee

Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and) ss.
COUNTY OF Denver)

On this 7th day of November, 1985, before me personally came Michael D. Dunn, as Secretary, of Northern Copper Corporation, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Northern Copper Corporation, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Notary Public

My Commission Expires:

1-26-88

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AGREEMENT AND PLAN OF MERGER

THIS AGREEMENT AND PLAN OF MERGER is entered into to be effective as of November 7, 1985 between Copper Range Company, a Delaware corporation ("Delaware CRC") and Copper Range Company, a Michigan corporation ("Michigan CRC"). Delaware CRC and Michigan CRC are sometimes referred to jointly in this Agreement as the "Constituent Corporations".

WITNESSETH:

WHEREAS, Delaware CRC is a corporation duly organized and existing under the laws of the State of Delaware, with an authorized capital stock consisting of (a) 100,000,000 shares of common stock, par value $.001 per share, no shares of which are issued and outstanding, and (b) 10,000,000 shares of preferred stock, par value $.001 per share, of which no shares are issued and outstanding.

WHEREAS, Michigan CRC is a corporation duly organized and existing under the laws of the State of Michigan, with an authorized capital stock consisting of (a) 1,000 shares of common stock, par value $1.00 per share, 1,000 shares of which are issued and outstanding. Each share of common stock is entitled to one vote on all matters.

WHEREAS, the respective Boards of Directors of the Constituent Corporations have by resolution declared it advisable and in the best interests of the respective corporations and their respective shareholders (if any) that Michigan CRC merge with and into Delaware CRC and that the terms and conditions of such merger and the manner and basis for converting shares of Michigan CRC common stock into Delaware CRC common stock shall be as follows:

ARTICLE I
Merger

1.01 In accordance with the provisions of this Agreement and Plan of Merger (the "Agreement") and the corporation laws of the States of Delaware and Michigan, Michigan CRC shall be merged with and into Delaware CRC, which shall be and is herein sometimes referred to as the "Surviving Corporation". Such transactions shall hereinafter be referred to as the "Merger".

ARTICLE II
Effective Date of Merger

2.01 Except as otherwise specifically set forth in this Agreement, the identity, existing purposes, powers, objectives, franchises, privileges, rights and immunities of Delaware CRC shall continue in effect and unimpaired by the Merger, and the corporate franchise, existence and rights of Michigan CRC shall be merged into Delaware CRC and Delaware CRC shall, as the Surviving Corporation, be fully vested therewith. The separate existence and corporate organization of Michigan CRC, except insofar as they may be continued by law, shall cease when the Merger shall become effective.

2.02 The Merger provided for in this Agreement shall not become effective until, and shall become effective at, 2:00 p.m., White Pine, Michigan time, on November 7, 1985, provided that prior to such date, the following actions shall have been completed.

A. This Agreement shall have been adopted by (i) the Board of Directors of Delaware CRC in accordance with the requirements of the General Corporation Law of Delaware, and (ii) by the shareholder of Michigan CRC in accordance with the requirements of the Michigan Business Corporation Act; and

B. The procedures specified in the laws of the States of Delaware and Michigan, as amended, to make the Merger effective under such laws shall have been complied with. The earliest date on or after 2:00 p.m., White Pine, Michigan time, November 7, 1985, on which the foregoing action shall have been completed shall hereinafter be referred to as the "Effective Date".

ARTICLE III

Certificate of Incorporation; Bylaws; Directors; Officers

3.01 The Certificate of Incorporation of Delaware CRC in force on the effective date shall remain and be the Certificate of Incorporation of Delaware CRC after the Effective Date until the same shall be altered or amended as provided therein or by applicable law.

3.02 The Bylaws of Michigan CRC in force on the Effective Date shall become the Bylaws of Delaware CRC after the Effective Date until the same shall be altered, replaced or amended according to the provisions of those Bylaws and the Certificate of Incorporation of Delaware CRC.

3.03 The Directors of Delaware CRC immediately prior to the Effective Date shall remain and continue as the directors of the Surviving Corporation, Delaware CRC, after the Effective Date until their successors shall have been elected and qualified. The names of the directors of Delaware CRC immediately prior to the Effective Date are as follows:

Name
Russell L. Wood
Michael D. Dunn
Eldon D. Kirsch
Dallas L. Burkhammer

If on the Effective Date a vacancy shall exist on the board of directors of the Surviving Corporation, such vacancy may thereafter be filled in the manner provided by the Bylaws of the Surviving Corporation.

3.04 The officers of Delaware CRC immediately prior to the Effective Date shall continue in office as the officers of the Surviving Corporation, Delaware CRC, after the Effective Date until their successors shall have been elected. Their names and titles shall be as follows:

Name	Position
Russell L. Wood	President
Herman Ponder	Vice President/Technology
Michael D. Dunn	Vice President/Secretary/ Treasurer
Richard F. Mauro	Assistant Secretary

If on the Effective Date a vacancy shall exist in any office of the Surviving Corporation, such vacancy may thereafter be filled in the manner provided by the Bylaws of the Surviving Corporation.

ARTICLE IV
Conversion of CRC Michigan Shares

4.01 Each share of the common stock of Michigan CRC issued and outstanding on the Effective Date and all rights in respect thereof automatically shall be changed and converted on the Effective Date into one fully paid and non-assessable share of the common stock of Delaware CRC.

4.02 On the Effective Date, or as soon thereafter as possible, each holder of an outstanding certificate representing common stock of Michigan CRC shall be required to surrender the same (duly authorized as Delaware CRC shall so require), to Delaware CRC or its duly authorized agent for cancellation, and each such holder, upon such surrender or upon presentment of such certificate or certificates for transfer or reissuance in the ordinary course of business shall be entitled to receive in exchange therefor a certificate or certificates representing the number of shares of Delaware CRC common stock into which the common stock of Michigan CRC previously represented by the surrendered certificate or certificates shall have been changed and converted as provided in this Agreement. Until so surrendered or presented, the outstanding certificates which prior to the Effective Date represented common stock of Michigan CRC shall be deemed and treated for all corporate purposes to represent the ownership of the number of shares of common stock of Delaware CRC as though the surrender or presentment had taken place.

4.03 The shares of Delaware CRC common stock deliverable pursuant to the terms and conditions of this Agreement shall bear a legend in the form substantially as follows:

> "The shares represented by this Certificate have not been registered or qualified under federal or state securities laws. The shares may not be offered for sale, sold, pledged or otherwise disposed of unless so registered or qualified or unless an exemption exists, the availability of which is to be confirmed by an opinion of counsel (which opinion and counsel shall both be reasonably satisfactory to the Company).

ARTICLE V
Effects of Merger

5.01 Upon the Effective Date:

(a) The Surviving Corporation shall possess all of the rights, privileges, powers, immunities, and franchises, of a public and of a private nature, of each of the Constituent Corporations. In addition, all property, real, personal and mixed, including all patents, patent applications, trademarks, together with the good will of the business in connection with which said patents or trademarks are used, and all debts due on whatever account, including subscriptions to shares, and all other choses in action, and every other interest of, or belonging to, or due to each or either of the Constituent Corporations shall be taken and deemed to be transferred and vested in the Surviving Corporation, without further act or deed; and the title to all real estate, or any interest therein, vested in either of the Constituent Corporations shall not revert or be in any way impaired by reason of the Merger;

(b) The Surviving Corporation shall be responsible for all of the debts, liabilities, obligations and duties of each of the Constituent Corporations, and all said debts, liabilities, obligations and duties shall attach to the Surviving

Corporation and may be enforced against it to the same extent as if said debts, liabilities, obligations and duties had been incurred or contracted by it. The liabilities of the Constituent Corporations or of their respective shareholders, directors or officers, shall not be affected by the Merger. The rights of the creditors of the Constituent Corporations or of any person dealing with the Constituent Corporations shall not be affected by the Merger. All rights of the creditors and liens upon any property of either of the Constituent Corporations shall be preserved and unimpaired, and any action or proceeding pending by or against either of the Constituent Corporations may be prosecuted to judgment the same way as if the Merger had not taken place, which judgment shall bind the Surviving Corporation; and

(c) All corporate acts, plans, policies, contracts, approvals and authorizations of the Constituent Corporations and their respective shareholders, Boards of Directors, committees elected or appointed by their Boards of Directors, officers and agents, which were valid and effective immediately prior to the Effective Date shall be taken for all purposes as the acts, plans, policies, contracts, approvals and authorizations of the Surviving Corporation and shall be as effective and binding thereon as the same were with respect to the Constituent Corporations. The then employees, if any, of each of the Constituent Corporations shall become the employees of the Surviving Corporation and shall continue to be entitled to the same rights and benefits which they enjoy as employees of the Constituent Corporations.

5.02 If at any time after the Effective Date the Surviving Corporation shall consider or be advised that any further assignments or assurances in law or other things are necessary or desirable to vest, perfect, confirm, or record in the Surviving Corporation the title to any property or rights of either of the Constituent Corporations acquired or to be acquired by reason of, or as a result of the Merger, then the Constituent Corporations and their proper officers and directors shall execute and deliver all proper deeds, assignments and assurances in law and do all things necessary or proper to vest, perfect or confirm title to such property or rights in the Surviving Corporation, and otherwise to carry out the purposes of this Agreement, and the proper officers and directors of Michigan CRC and the proper officers and directors of Delaware CRC are fully authorized to take any and all such action.

ARTICLE VI
Obligations of the Constituent Corporations

6.01 Each of the Constituent Corporations shall take or cause to be taken all actions, and do or cause to be done all things, necessary, proper or advisable, under the laws of the

States of Michigan and Delaware, to consummate and effect the Merger, subject, however, to the lawful approval of the shareholders of Michigan CRC and the board of directors of Delaware CRC in accordance with the requirements of the applicable provisions of the laws of Michigan and Delaware and subject further to the terms and provisions set forth in this Agreement.

ARTICLE VII
Approval of Shareholders

7.01 This Agreement shall be submitted to the shareholders of Michigan CRC in the manner provided for in the Michigan Business Corporation Act, and, for the Merger to be effective, must be approved or adopted by the affirmative vote of holders representing not less than a majority of the total number of issued and outstanding shares of Michigan CRC stock.

7.02 This Agreement shall have been approved by the board of directors of Delaware CRC in the manner provided for in the General Corporation Law of Delaware.

ARTICLE VIII
Amendment

At any time before or after approval or adoption by the Constituent Corporations of this Agreement, this Agreement may be amended in matters of form, or supplemented by additional agreements, articles or certificates, as may be determined in the judgment of the Boards of Directors of the Constituent Corporations to be necessary, desirable, or expedient to clarify the intention of the parties to this Agreement or to effect or facilitate the filing, recording or official approval of this Agreement and the Merger, in accordance with the purpose and intent of this Agreement.

IN WITNESS WHEREOF, this Agreement and Plan of Merger has been executed and attested to by the persons indicated below to be effective as of November 7, 1985.

ATTEST:

Michael D. Dunn
Michael D. Dunn, Secretary

COPPER RANGE COMPANY
(a Delaware corporation)

By Russell L. Wood
Russell L. Wood, President

ATTEST:

COPPER RANGE COMPANY
(a Michigan corporation)

Michael D. Dunn
Michael D. Dunn, Secretary

By Russell L. Wood
Russell L. Wood, President

STATE OF Colorado)
City and COUNTY OF Denver) as.
)

On this 7th day of November, 1985, before me personally came Russell L. Wood as President of Copper Range Company, a Delaware corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Fitze
Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and COUNTY OF Denver) as.
)

On this 7th day of November, 1985, before me personally came Michael D. Dunn as Secretary of Copper Range Company, a Delaware corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Fitze
Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and
COUNTY OF Denver) ss.
)

On this 7th day of November, 1985, before me personally came Russell L. Wood as President of Copper Range Company, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Fitte
Notary Public

My Commission Expires:

1-26-88

STATE OF Colorado)
City and
COUNTY OF Denver) ss.
)

On this 7th day of November, 1985, before me personally came Michael D. Dunn as Secretary of Copper Range Company, a Michigan corporation, who, being duly sworn by me, acknowledged that he executed the foregoing instrument on behalf of Copper Range Company, that he had the authority to execute the same, and that he executed the same as the act and deed of said entity for the uses and purposes therein stated.

Lori Fitte
Notary Public

My Commission Expires:

1-26-88

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PAGE 1

State of Delaware

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DOCUMENTARY SURCHARGE PAID $3.[illegible]

Office of Secretary of State

I, MICHAEL HARKINS, SECRETARY OF STATE OF THE STATE OF DELAWARE DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF MERGER OF "CRC ACQUISITION COMPANY" MERGING WITH AND INTO "COPPER RANGE COMPANY" UNDER THE NAME OF "COPPER RANGE COMPANY" AS RECEIVED AND FILED IN THIS OFFICE THE TWENTY-FIFTH DAY OF MAY, A.D. 1989, AT 4 O'CLOCK P.M.

: : : : : : : : : :

DEPARTMENT OF STATE
OFFICE OF THE SECRETARY OF STATE
1835 1793 1970
DELAWARE

899145172

Michael Harkins, Secretary of State

AUTHENTICATION: 2193158

DATE: 05/25/1989

BOOK 873 PAGE 817 FILED

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CERTIFICATE OF MERGER

OF

CRC ACQUISITION COMPANY

INTO

COPPER RANGE COMPANY

(Pursuant to Section 251 of the General Corporation Law of the State of Delaware)

* * * * *

The undersigned does hereby certify that:

FIRST: The name and state of incorporation of each of the constituent corporations is as follows:

Name	State of Incorporation
Copper Range Company	Delaware
CRC Acquisition Company	Delaware

SECOND: An Agreement and Plan of Merger (the "Agreement") dated as of April 25, 1989, among Copper Range Company, Metall Mining Corporation, a Canada corporation, MMC Holdings, Inc., a Delaware corporation and CRC Acquisition Company has been approved, adopted, certified, executed and acknowledged by each of the constituent corporations in accordance with the requirements of Section 251(c) of the General Corporation Law of the State of Delaware.

THIRD: The name of the surviving corporation is Copper Range Company.

CERTIFICATE OF MERGER

OF

CRC ACQUISITION COMPANY

INTO

COPPER RANGE COMPANY

(Pursuant to Section 251 of
the General Corporation Law of the State of Delaware)

* * * * *

The undersigned does hereby certify that:

FIRST: The name and state of incorporation of each of the constituent corporations is as follows:

Name	State of Incorporation
Copper Range Company	Delaware
CRC Acquisition Company	Delaware

SECOND: An Agreement and Plan of Merger (the "Agreement") dated as of April 25, 1989, among Copper Range Company, Metall Mining Corporation, a Canada corporation, MMC Holdings, Inc., a Delaware corporation and CRC Acquisition Company has been approved, adopted, certified, executed and acknowledged by each of the constituent corporations in accordance with the requirements of Section 251(c) of the General Corporation Law of the State of Delaware.

THIRD: The name of the surviving corporation is Copper Range Company.

FOURTH: The certificate of incorporation of the surviving corporation shall be amended in its entirety as set forth in Exhibit A.

FIFTH: The executed Agreement is on file at the principal place of business of the surviving corporation at P.O. Box 100, Wilcox Road, White Pine, Michigan 49971.

SIXTH: A copy of the Agreement will be furnished by the surviving corporation, on request and without cost, to any stockholder of any constituent corporation.

SEVENTH: This Certificate of Merger shall be effective at May 25, 1989.

IN WITNESS WHEREOF, the undersigned has caused this instrument to be duly executed by its authorized officers.

Dated: May 25, 1989

COPPER RANGE COMPANY

By [signature]
President

[SEAL]

Attest:

[signature]
Secretary

CRC ACQUISITION COMPANY

By [signature]
Vice-President

[SEAL]

Attest:

Richard J. Balfour
Secretary

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AGREEMENT AND PLAN OF MERGER

dated as of

April 25, 1989

among

COPPER RANGE COMPANY,

METALL MINING CORPORATION,

MMC HOLDINGS INC.

and

CRC ACQUISITION COMPANY

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AGREEMENT AND PLAN OF MERGER

AGREEMENT AND PLAN OF MERGER dated as of April 25, 1989 among Copper Range Company, a Delaware corporation (the "Company"), Metall Mining Corporation, a Canada corporation ("Parent"), MMC Holdings Inc., a Delaware corporation and a wholly owned subsidiary of Parent ("Buyer"), and CRC Acquisition Company, a Delaware corporation and a wholly owned subsidiary of Buyer ("Merger Subsidiary").

The parties hereto agree as follows:

ARTICLE I

THE MERGER

SECTION 1.01. The Merger. (a) At the Effective Time (as defined in Section 1.01(b)), Merger Subsidiary shall be merged (the "Merger") with and into the Company in accordance with the General Corporation Law of the State of Delaware ("Delaware Law"), whereupon the separate existence of Merger Subsidiary shall cease, and the Company shall be the surviving corporation (the "Surviving Corporation").

(b) As soon as practicable after satisfaction or, to the extent permitted hereunder, waiver of all conditions to the Merger, the Company and Merger Subsidiary will file a certificate of merger with the Secretary of State of the State of Delaware and make all other filings or recordings required by Delaware Law in connection with the Merger. The Merger shall become effective at such time as the certificate of merger is duly filed with the Secretary of State of the State of Delaware or at such later time as is specified in the certificate of merger (the "Effective Time").

(c) From and after the Effective Time, the Surviving Corporation shall possess all the rights, privileges, powers and franchises and be subject to all of the restrictions, disabilities and duties of the Company and Merger Subsidiary, all as provided under Delaware Law.

SECTION 1.02. Conversion of Shares. (a) At the Effective Time:

(i) each share of common stock of the Company, par value $0.001 per share (a "Share") held by the Company as treasury stock or owned by Buyer or any subsidiary of Buyer immediately prior to the Effective Time shall be cancelled, and no payment shall be made with respect thereto;

(ii) each share of common stock of Merger Subsidiary outstanding immediately prior to the Effective Time shall be converted into and become one share of common stock of the Surviving Corporation with the same rights, powers and privileges as the shares so converted and shall constitute the only outstanding shares of capital stock of the Surviving Corporation; and

(iii) each Share outstanding immediately prior to the Effective Time shall, except as otherwise provided in clause (i) of this Section 1.02(a) or as provided in Section 1.04 with respect to Shares as to which appraisal rights have been exercised, be converted into the right to receive the Merger Consideration, as defined in Section 1.02(b), from Buyer.

(b) For purposes of this Agreement, the "Merger Consideration" shall comprise the Initial Consideration and the Contingent Consideration, as defined below.

(i) The "Initial Consideration" shall equal an amount in cash per Share equal to U.S. $83.00 plus interest on U.S. $80.00 at a rate of 9% per annum from and including March 16, 1989 to but excluding the day on which the Effective Time occurs.

(ii) The "Contingent Consideration" shall consist of the right to receive from Buyer the following amounts per Share in cash, without interest, at the following times:

(x) as soon as reasonably practicable after receipt by the Surviving Corporation of (A) a ruling (the "Ruling") from the United States Internal Revenue Service (the "IRS") in form and substance reasonably satisfactory to

Buyer and the Surviving Corporation to the effect that the common stock of the Surviving Corporation constitutes qualifying employer securities within the meaning of Section 409(l) of the Internal Revenue Code of 1986, as amended (the "Code") and that dividends paid by the Surviving Corporation on its shares of such common stock contributed to the New ESOP (as defined in Section 5.08) are deductible for United States federal income tax purposes to the extent permitted under Section 404(k) of the Code and (B) a determination letter (the "Determination Letter") from the IRS to the effect that the New ESOP qualifies as an employee stock ownership plan within the meaning of Section 4975(e)(7) of the Code, the excess, if any, of U.S. $1.00 plus, if the Surviving Corporation has not received the Determination Letter by the date on which it receives the Ruling, interest thereon at a rate of 9 1/2% per annum from and including the date of receipt of the Ruling to but excluding the date of receipt of the Determination Letter, over the Prepaid Amount (as defined below);

(y) as soon as reasonably practicable after a determination by the Surviving Corporation that the amount of ore milled by the Surviving Corporation in calendar year 1989 shall have equaled or exceeded 5,233,200 dry tons (i.e. an average of 14,700 dry tons per day for a 356-day year), the excess, if any, of U.S. $4.00 over the Prepaid Amount; and

(z) as soon as reasonably practicable after the delivery to the Surviving Corporation of its audited consolidated financial statements for each of the calendar years 1989 through 1993, the excess, if any, of the Profit Amount for such year over the Prepaid Amount.

The following definitions shall apply for purposes of determining the amount of Contingent Consideration payable under each of the foregoing clauses:

(1) The "Prepaid Amount" shall be U.S. $3.00 at the Effective Time and shall accrue interest at the rate of 10% per annum, compounded annually. The Prepaid Amount shall be reduced by the per Share amount of the payment of Contingent Consideration that would have been required to be made but for the deduction of the Prepaid Amount, immediately after each date on which Buyer would have been required to make such a payment.

(2) "Operating Profit" with respect to any calendar year shall mean the Surviving Corporation's consolidated operating profit (EBDIT) calculated on a basis consistent with the calculation of such amounts on Schedule 3.07, using amounts shown on, derived from, or consistent with audited consolidated statements of operations of the Company prepared on a basis consistent with the financial statements referred to in Section 3.07(a); provided that in no event shall (i) payments made pursuant to Section 10.04(d) or (ii) charges paid by the Company to the Buyer, the Parent or any corporation that is a subsidiary or affiliate of the Buyer or the Parent or a member of the same affiliated group (as defined in Section 1504(a) of the Code without regard to Section 1504(b) of the Code) as the Buyer or the Parent for general allocation of overhead, except for reasonable amounts charged for specific services rendered to the Company that the Company otherwise would have paid in the ordinary course of business, be taken into account in calculating Operating Profit for purposes of this definition.

(3) "Profit Amount" with respect to any calendar year shall mean one one-millionth of the excess, if any, of the Operating Profit for such year over the Target Amount for such year; provided that the Profit Amount (i) shall not exceed U.S. $2.00 with respect to the calendar years 1989 and 1990 and shall not exceed U.S. $3.00 with respect to the calendar years 1991, 1992 and 1993 and (ii) shall be rounded to the nearest U.S. $.01.

(4) "Target Amount" shall mean U.S. $51,800,000, $38,800,000, $27,100,000, $39,900,000 and $37,600,000 with respect to each of the years 1989 through 1993, respectively.

(c) The Contingent Consideration shall not be represented by certificates and shall not be assignable or transferable other than pursuant to the laws of descent and distribution. Former shareholders of the Company shall be entitled only to payment from Buyer of the amounts determined pursuant to clauses (i) through (iv) Section 1.02(b), as and when the same shall become due and payable, and shall not be entitled to any rights as stockholders of Buyer or the Surviving Corporation.

(d) Each payment of Contingent Consideration pursuant to clause (iii) of Section 1.02(b) shall be accompanied by a copy of a certificate of the independent accountants of the Surviving Corporation confirming the calculation of the amount of such payment being made. The recipients of the Contingent Consideration, acting as a group, upon the authorization of recipients entitled to no less than 30% of the aggregate Contingent Consideration, may appoint, at their own expense, a firm of independent accountants to verify the calculation of the payments of Contingent Consideration made, and Parent agrees to cause the Surviving Corporation to afford such independent accountants reasonable access to the information necessary to verify such calculations.

(e) From the Effective Time until December 31, 1989, Buyer agrees to cause the Surviving Corporation to operate the mine and mill in good faith and to use its best efforts, consistent with good mining practice and the Company's 1989 Mining Plan dated December 18, 1988 (the "1989 Mining Plan"), to achieve the average daily tonnage set forth in clause (ii) of Section 1.02(b).

(f) From the Effective Time until December 31, 1993, Buyer agrees to cause the Surviving Corporation to operate its business in good faith consistent with good mining practice so that the Contingent Consideration payable by Buyer under clause (iii) of Section 1.02(b) will not be unreasonably affected.

(g) Parent hereby guarantees the performance of Buyer's obligation pursuant to Section 1.02(b) to pay the Contingent Consideration.

SECTION 1.03. Surrender and Payment. (a) Each holder of Shares that have been converted into a right to receive the Merger Consideration, upon surrender to Buyer of a certificate or certificates representing such Shares, duly endorsed or accompanied by stock powers duly endorsed in blank, will be entitled to receive the Merger Consideration payable in respect of such Shares. Until so surrendered, each such certificate shall, after the Effective Time, represent for all purposes, only the right to receive such Merger Consideration. Following the termination of the Old ESOP (as hereinafter defined), First America Bank-Detroit, N.A., as the agent for the participants in the Old ESOP, shall receive and disburse the Contingent Consideration in proportion to and in accordance with the participant's account balances in the Old ESOP at the date of termination of the Old ESOP (excluding for such purposes, any participant who demands appraisal rights in accordance with Delaware law).

(b) If any portion of the Merger Consideration is to be paid to a Person other than the registered holder of the Shares represented by the certificate or certificates surrendered in exchange therefor, it shall be a condition to such payment that the certificate or certificates so surrendered shall be properly endorsed or otherwise be in proper form for transfer and that the Person requesting such payment shall pay to Buyer any transfer or other taxes required as a result of such payment to a Person other than the registered holder of such Shares or establish to the satisfaction of Buyer that such tax has been paid or is not payable. For the purposes of this Agreement, "Person" means an individual, a corporation, a partnership, an association, a trust or any other entity or organization, including a government or a political subdivision or an agency or instrumentality thereof.

(c) After the Effective Time, there shall be no further registration of transfers of Shares. If, after the Effective Time, certificates formerly representing Shares are presented to the Surviving Corporation, they shall be cancelled and exchanged for the consideration provided for, and in accordance with the procedures set forth, in this Article I.

(d) Buyer shall not be liable to any holder of Shares for any amount paid to a public official pursuant to applicable abandoned property laws. Any amounts remaining unclaimed by holders of Shares three years after (i) the Effective Time, in the case of the Initial Consideration, or (ii) the date such amounts shall have become payable, in the case of payments with respect to the Contingent Consideration (or in either case such earlier date immediately prior to such time as such amounts would otherwise escheat to or become property of any governmental entity) shall, to the extent permitted by applicable law, become the property of

Buyer free and clear of any claims or interest of any Person previously entitled thereto.

(e) The Company understands that unless it shall have delivered to Buyer an affidavit described in Section 1445(b)(3) of the Code stating that the Company is not and has not been a United States real property holding corporation at any time during the five year period preceding the Effective Time, Buyer shall withhold 10% of the Merger Consideration pursuant to Section 1445(a) of the Code from each owner of Shares outstanding immediately prior to the Effective Time who shall not have furnished Buyer prior to the Effective Time with an affidavit described in Section 1445(b)(2) of the Code stating such owner's U.S. taxpayer identification number and that such owner is not a foreign person.

SECTION 1.04. Dissenting Shares. Notwithstanding Section 1.02, Shares outstanding immediately prior to the Effective Time and held by a holder who has not voted in favor of the Merger or consented thereto in writing and who has demanded appraisal for such Shares in accordance with Delaware Law shall not be converted into a right to receive the Merger Consideration, unless such holder fails to perfect or withdraws or otherwise loses his right to appraisal. If after the Effective Time such holder fails to perfect or withdraws or loses his right to appraisal, such Shares shall be treated as if they had been converted as of the Effective Time into a right to receive the Merger Consideration. The Company shall give Buyer prompt notice of any demands received by the Company for appraisal of Shares, and Buyer shall have the right to participate in all negotiations and proceedings with respect to such demands. The Company shall not, except with the prior written consent of Buyer, make any payment with respect to, or settle or offer to settle, any such demands.

ARTICLE II

THE SURVIVING CORPORATION

SECTION 2.01. Certificate of Incorporation. At the Effective Time, the certificate of incorporation of the Surviving Corporation (other than Articles First and Seventh, which shall remain in effect unchanged) shall be amended to be identical to the certificate of incorporation of Merger Subsidiary in effect immediately prior to such time.

SECTION 2.02. Bylaws. The bylaws of Merger Subsidiary in effect immediately prior to the Effective Time shall become the bylaws of the Surviving Corporation until amended in accordance with applicable law.

SECTION 2.03. Directors and Officers. From and after the Effective Time, until successors are duly elected or appointed and qualified in accordance with applicable law, the directors and officers of the Merger Subsidiary in office immediately prior to the Effective Time shall be the directors and officers of the Surviving Corporation.

ARTICLE III

REPRESENTATIONS AND WARRANTIES OF THE COMPANY

The Company represents and warrants to Buyer that:

SECTION 3.01. Corporate Existence and Power. The Company is a corporation duly incorporated, validly existing and in good standing under the laws of the State of Delaware, and has all corporate powers and all material governmental licenses, authorizations, consents and approvals required to carry on its business as now conducted. The Company is duly qualified to do business as a foreign corporation and is in good standing in (i) the State of Michigan and (ii) each other jurisdiction where the character of the property owned or leased by it or the nature of its activities makes such qualification necessary, except for those jurisdictions where the failure to be so qualified would not, individually or in the aggregate, have a material adverse effect on the condition (financial or otherwise), business, assets, results of operations or prospects of the Company and its Subsidiary (as defined in Section 3.06), taken as a whole (a "Material Adverse Effect"). The Company has heretofore delivered to Buyer true and complete copies of the certificate of incorporation and bylaws of the Company and its Subsidiary as currently in effect.

SECTION 3.02. Corporate Authorization. The execution, delivery and performance by the Company of this Agreement and the consummation by the Company of the transactions contemplated hereby are within the Company's corporate powers and, except for any required approval by the Company's stockholders and by the participants in the Old ESOP in connection with the consummation of the Merger, have been duly authorized by all necessary corporate action. This Agreement constitutes a valid and binding agreement of the Company.

SECTION 3.03. Governmental Authorization; Consents. (a) The execution, delivery and performance by the Company of this Agreement and the consummation of the Merger by the Company require no action by or in respect of, or filing with, any governmental body, agency, official or authority other than (i) the filing and recording of a certificate of merger in accordance with Delaware Law and (ii) compliance with any applicable requirements of the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended (the "HSR Act").

(b) Except as set forth in Schedule 3.03, no consent, approval, waiver or other action by any Person (other than the governmental authorities referred to in (a) above) under any contract, agreement, indenture, lease, instrument or other document to which the Company or its Subsidiary is a party or by which either of them is bound is required or necessary for the execution, delivery and performance of this Agreement by the Company or the consummation of the transactions contemplated hereby.

SECTION 3.04. Non-contravention. Except as set forth in Schedule 3.04, the execution, delivery and performance by the Company of this Agreement and the consummation by the Company of the transactions contemplated hereby do not and will not (i) contravene or conflict with the certificate of incorporation or bylaws of the Company, (ii) assuming compliance with the matters referred to in Section 3.03, contravene or conflict with or constitute a violation of any provision of any law, regulation, judgment, injunction, order or decree binding upon or applicable to the Company or its Subsidiary, (iii) constitute a default under or give rise to a right of termination, cancellation or acceleration of any right or obligation of the Company or its Subsidiary or to a loss of any benefit to which the Company or its Subsidiary is entitled under any provision of any material agreement, contract or other instrument binding upon the Company or its Subsidiary or any material license, franchise, permit or other similar authorization held by the Company or its Subsidiary or (iv) result in the creation or imposition of any Lien on any asset of the Company or its Subsidiary material to the conduct of their respective businesses as currently conducted, taken as a whole (the "Business"). For purposes of this Agreement, "Lien" means, with respect to any asset, any mortgage, lien, pledge, charge, security interest, royalty or similar interest or encumbrance of any kind in respect of such asset.

SECTION 3.05. Capitalization. (a) The authorized capital stock of the Company consists of 2,000,000 shares of common stock, par value $0.001 per share, and 100,000 shares of preferred stock, par value $0.001 per share. Schedule 3.05 sets forth the names and addresses of each record owner of the Shares and the number of Shares held by each such record owner. All outstanding shares of capital stock of the Company have been duly authorized and validly issued and are fully paid and nonassessable. Except as set forth in Schedule 3.05 or this Section 3.05(a), there are outstanding (i) no shares of capital stock or other voting securities of the Company, (ii) no securities of the Company convertible into or exchangeable for shares of capital stock or voting securities of the Company and (iii) no options or other rights to acquire from the Company, and no obligation of the Company to issue, any capital stock, voting securities or securities convertible into or exchangeable for capital stock or voting securities of the Company (the items in clauses (i), (ii) and (iii) being referred to collectively as the "Company Securities"). There are no outstanding obligations of the Company or its Subsidiary to repurchase, redeem or otherwise acquire any Company Securities other than pursuant to (x) Section 14(b) of the Old ESOP and (y) each of the Stock Agreements listed in Schedule 3.05.

(b) The outstanding indebtedness for borrowed money of the Company and its Subsidiary consists solely of debt outstanding under the Credit Agreement dated as of January 10, 1989 among the Company, the Banks named therein and Chemical Bank, as Agent (together with the other agreements and documents delivered in connection therewith, the "Chemical Agreement") and the Commodity Purchase, Loan and Security Agreement dated October 1, 1985 between Philipp Brothers, Inc. and the Company, as amended (together with the other agreements and documents delivered in connection therewith, the "Phibro Agreement"). As of April 11, 1989, $37,000,000 (plus accrued interest, if any) is outstanding under the Chemical Agreement.

SECTION 3.06. Subsidiaries. (a) Unlimited Developments Inc. is the sole Subsidiary of the Company. Such Subsidiary is a corporation duly incorporated, validly existing and in good standing under the laws of its jurisdiction of incorporation, has all corporate powers and all material governmental licenses, authorizations, consents and approvals required to carry on its business as now conducted and is duly qualified to do business as a foreign corporation and is in good standing in each jurisdiction where the character of the property owned or leased by it or the nature of its activities make such qualification necessary, except for those jurisdictions where failure to be so qualified would not, individually or in the aggregate, have a Material Adverse Effect. For purposes of this Agreement, "Subsidiary" means any entity of which securities or other ownership interests having ordinary voting power to elect a majority of the board of directors or other persons performing similar functions are directly or indirectly owned by the Company.

(b) All of the outstanding capital stock of, or other ownership interests in, the Subsidiary, is owned by the Company, directly or indirectly, free and clear of any Lien and free of any other limitation or restriction (including any restriction on the right to vote, sell or otherwise dispose of such capital stock or other ownership interests). There are no outstanding (i) securities of the Company or any Subsidiary convertible into or exchangeable for shares of capital stock or other voting securities or ownership interests in the Subsidiary or (ii) options or other rights to acquire from the Company or the Subsidiary, and no other obligation of the Company or the Subsidiary to issue, any capital stock, voting securities or other ownership interests in, or any securities convertible into or exchangeable for any capital stock, voting securities or ownership interests in, the Subsidiary (the items in clauses (i) and (ii) being referred to collectively as the "Subsidiary Securities"). There are no outstanding obligations of the Company or the Subsidiary to repurchase, redeem or otherwise acquire any outstanding Subsidiary Securities.

SECTION 3.07. Financial Statements. (a) The audited consolidated balance sheets of the Company and its Subsidiary as of December 31, 1988 (the "Balance Sheet") and the related consolidated statements of operations, changes in stockholders' equity (deficit) and changes in financial position for the year ended December 31, 1988 and the notes related thereto, copies of which have been delivered to Buyer, fairly present, in conformity with generally accepted accounting principles applied on a consistent basis (except as may be indicated in the notes thereto), the consolidated financial position of the Company and its Subsidiary as of the dates thereof and their consolidated results of operations, changes in stockholders' equity (deficit) and changes in financial position for the periods then ended. For purposes of this Agreement, "Balance Sheet Date" means December 31, 1988.

(b) The financial projections set forth in Schedule 3.07 are based upon good faith estimates and assumptions, and nothing has come to the attention of the Company which could reasonably be expected to have a material and adverse effect on such projections; provided that nothing in this Section 3.07(b) shall be construed as a representation as to future prices of copper, silver or any other metal.

SECTION 3.08. Disclosure Documents. The information statement of the Company (the "Company Information Statement") to be prepared by the Company in connection with the Company Stockholder Meeting (as defined in Section 5.02), as amended or supplemented, if applicable, (i) at the time the Company Information Statement or any amendment or supplement thereto is first mailed to stockholders of the Company, (ii) at the time such stockholders vote on adoption of this Agreement and (iii) at the Effective Time, will not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in the light of the circumstances under which they were made, not misleading. The representations and warranties contained in this Section 3.08 will not apply to statements or omissions included in the Company Information Statement based upon information furnished to the Company in writing by Buyer specifically for use therein.

SECTION 3.09. Absence of Certain Changes. Except as set forth in Schedule 3.09, since the Balance Sheet Date, the Company and its Subsidiary have conducted their business in the ordinary course consistent with past practice and there has not been:

(i) any event that has had or may reasonably be expected to have a Material Adverse Effect, other than an event that has resulted in or may reasonably be expected to result in any change in the present or anticipated price of copper, silver or any other metal which change has had or may reasonably be expected to have a Material Adverse Effect;

(ii) any declaration, setting aside or payment of any dividend or other distribution with respect to any shares of capital stock of the Company;

(iii) any alteration in any material term of any outstanding security of the Company or its Subsidiary;

(iv) any (A) incurrence, assumption or guarantee by the Company or its Subsidiary of any debt other than in the ordinary course of business in amounts and on terms consistent with past practices, (B) issuance or sale of any securities convertible into or exchangeable for debt securities of the Company or its Subsidiary or (C) issuance or sale of options or other rights to acquire from the Company or its Subsidiary, directly or indirectly, debt securities of the Company or any Subsidiary or any securities convertible into or exchangeable for any such debt securities;

(v) any creation or assumption by the Company or its Subsidiary of any Lien on any material asset other than pursuant to the Phibro Agreement and the Chemical Agreement;

(vi) any making of any loan, advance or capital contributions to or investment in any Person other than loans, advances or capital contributions to or investments in wholly-owned Subsidiaries made in the ordinary course of business consistent with past practices;

(vii) any damage, destruction or other casualty loss (whether or not covered by insurance) affecting the business or assets of the Company or its Subsidiary which, individually or in the aggregate, has had or may reasonably be expected to have a Material Adverse Effect;

(viii) any (A) transaction or commitment made, or any contract or agreement entered into, by the Company or its Subsidiary relating to its assets or business (including the acquisition or disposition of any substantial assets) or any relinquishment by the Company or its Subsidiary of any contract or other right, in either case, material to the Company and its Subsidiary taken as a whole, other than transactions and commitments in the ordinary course of business consistent with past practice or those contemplated by this Agreement or (B) any capital expenditures or any commitment to make any capital expenditure made by the Company or its Subsidiary which expenditure or commitment is for an amount in excess of $250,000;

(ix) any change in any method of accounting or accounting practice by the Company and its Subsidiary, except for any such change required by reason of a concurrent change in generally accepted accounting principles;

(x) any grant of any severance or termination pay to any officer or employee of the Company or its Subsidiary, any entering into of any employment, deferred compensation or other similar agreement (or any amendment to any such existing agreement) with any officer, director or employee of the Company or its Subsidiary, any increase in benefits payable under any existing severance or termination pay policies or employment agreements or, other than as contemplated by this Agreement, any increase in compensation, bonus or other benefits payable to officers, directors or employees of the Company or its Subsidiary, other than increases in the ordinary course of business consistent with past practice;

(xi) any labor dispute, other than routine individual grievances, or any activity or proceeding by a labor union or representative thereof to organize any employees of the Company or its Subsidiary, which employees were not subject to a collective bargaining agreement at the Balance Sheet Date, or any lockouts, strikes, slowdowns, work stoppages or threats thereof by or with respect to such employees;

(xii) any forward sale or agreement or commitment to forward sales of, or any options transaction in, copper or silver or any other mineral;

(xiii) any change in the outstanding shares of the capital stock or other ownership interests in or the capitalization of the Company or its Subsidiary, whether by reason of a reclassification, recapitalization, stock split or combination, exchange or readjustment of shares, stock dividend or otherwise;

(xiv) other than as required by the terms of the Old ESOP or the Stock Agreements listed on Schedule 3.05, any repurchase, redemption or other acquisition by the Company or its Subsidiary of any outstanding shares of capital stock or other ownership interests in or other securities of the Company or its Subsidiary; or

(xv) any agreement or arrangement made by the Company or its Subsidiary to take any action which, if taken prior to the date hereof, would have made any representation or warranty in this Section 3.09 untrue or incorrect.

SECTION 3.10. Properties. (a) Schedule 3.10A identifies all material Real Property held for use or used in the business of the Company and its Subsidiary and which the Company or its Subsidiary owns or leases, has agreed (or has an option) to purchase, sell or lease, or may be obligated to purchase, sell or lease, specifying in the case of leases, the name of the lessor. For purposes of this Agreement, "Real Property" means all real property and interests in real property, including, without limitation, all estates in fee simple, leasehold estates, all mineral interests, mineral leases, mineral or mining claims (patented or unpatented, federal, state or private) mineral licenses, profits a prendre, rights of entry, overriding royalty interests and any other arrangements constituting a legal or beneficial interest in any minerals, including sand, gravel, other aggregates, or other substances located on or under any real property, whether or not such substance is a locatable mineral for purposes of the federal Mining Law of 1872, as amended.

(b) Subject to the Liens created under the Chemical Agreement and the Phibro Agreement, and other than disclosed in Schedule 3.10, the Company and its Subsidiary have good and marketable title to, or in the case of leased property have valid leasehold interests in, all material tangible and intangible properties and assets (other than Real Property) reflected on the Balance Sheet or acquired after the Balance Sheet Date, except for properties and assets sold since the Balance Sheet Date in the ordinary course of business consistent with past practices.

(c) Except as disclosed in Schedule 3.10:

(i) the Company and its Subsidiary have good and marketable title to, or in the case of leased Real Property have valid leasehold interests in, the Real Property listed on Schedule 3.10A(2) as core properties (the "Core Properties"), except for minor defects in title that do not materially interfere with the conduct of the Business or the utilization of any such property for its intended purpose, provided that with respect to those portions of the Core Properties which are not covered by title insurance obtained by the date hereof, this representation is made to the best of the Company's knowledge;

(ii) the Core Properties include all Real Property, and only such Real Property, as is used or held for use or to be used or held for use primarily in connection with the conduct of the business and operations of the Company and its Subsidiary as currently conducted and as presently planned to be conducted by the Company;

(iii) all leases of Core Properties are in good standing and are valid, binding and enforceable in accordance with their respective terms and there does not exist under any lease of any Core Property any material default or any event which with notice or lapse of time or both would constitute a material default;

(iv) the Company and its Subsidiary have access to public roads or valid easements over private streets or private property for such ingress to and egress from all Core Properties as is necessary for the conduct of the Business; and the Company and its Subsidiary have access to all water rights, electrical power and waste disposal facilities necessary for the conduct of the Business;

(v) none of the material structures on the Core Properties encroaches upon Real Property of another Person, and, to the best knowledge of the Company, no structure of any other Person substantially encroaches upon any Core Properties;

(vi) the Company has exercised the Option contained in the Refinery Lease and Option to Purchase Agreement dated as of January 1, 1985 between White Pine Leasing Inc., a wholly-owned subsidiary of The Louisiana Land and Exploration Company, and the Company as amended by the First Amendment dated as of November 7, 1985 and the Second Amendment dated as of November 30, 1987, and has purchased the "Leased Assets" (as defined in such agreement) at a purchase price of approximately $14,500,000;

(vii) except as would not have a Material Adverse Effect or materially impair the operation of the Company's mine: all mine water has been removed and disposed of in compliance with all applicable laws, sound mining practice and without incurring liability to any third-party; all mines and mining sites have adequate drainage systems and have not, during their operation, experienced unusual or excessive seepage or accumulations of water; neither the Company nor its Subsidiary has incurred any liability, and, to the Company's best knowledge, no state of facts exists which could give rise to any liability for damages, whether by trespass or otherwise, relating to percolation of mine water on or off any Real Property of the Company or its Subsidiary; and

(viii) the Company and its Subsidiary have taken reasonable steps to avoid liability in connection with anything it owns, operates or controls or of which it has care or charge which under applicable law could reasonably be deemed to be an attractive nuisance on the Core Properties.

(d) To the best knowledge of the Company and its Subsidiary, except as disclosed in Schedule 3.10:

(i) neither the Company nor its Subsidiary has incurred any material liability, and no state of facts exists which could give rise to any material liability for damages, whether by trespass or otherwise, to the property or person of any third-party as a result of surface or subterranean subsidence;

(ii) all shafts and chambers located on the Core Properties currently in use have been "timbered", roof bolted or otherwise secured in compliance with all applicable laws and sound mining practice;

(iii) neither the Company nor its Subsidiary owns, operates, controls or has care or charge of any thing or activity which could be subject to regulation by the Interstate Commerce Commission;

(iv) neither the Company nor its Subsidiary has incurred any material liability, and no state of facts exists which could give rise to any material liability, whether by trespass or otherwise, for damage to the property or person of any third-party by operation of any interest in Real Property;

(v) the Company is in compliance with currently applicable laws regulating the emission of poisonous, hazardous and noxious gasses and fumes;

(vi) neither the Company nor its Subsidiary has, or is conducting any operations which, under applicable law, could constitute a co-tenancy or other form of concurrent or joint ownership with any third-party;

(vii) neither the Company nor its Subsidiary has incurred any material liability, and no state of facts exists which could give rise to any material liability, relating to interference with or damage to subterranean or surface waters;

(viii) the Company and its Subsidiary have paid all material taxes and other impositions relating to the extraction or processing of minerals or other substances;

(ix) neither the Company nor its Subsidiary owns or has control, charge or care of any stopes abandoned since November 7, 1985;

(x) the Company is not aware of any condition which could give rise to any material liability in connection with any stopes on the Core Properties abandoned prior to November 7, 1985 which are owned or controlled by, or under the charge or care of, the Company or its Subsidiary; and

(xi) none of the Company's mining claims is subject to the federal Mining Law of 1872.

(e) Except as disclosed in Schedule 3.10, none of the Core Properties or other properties or assets (whether tangible or intangible) material to the conduct of the Business is subject to any Liens, except:

(i) Liens created under the Phibro Agreement or the Chemical Agreement;

(ii) Liens disclosed on the Balance Sheet;

(iii) Liens for taxes not yet due or being contested in good faith (and for which adequate provision has been made on the Balance Sheet in conformity with generally accepted accounting principles); or

(iv) Liens which do not materially detract from the value of such property or assets as now used, or materially interfere with any present use of such property or assets or any use thereof currently intended by the Company.

(f) Except as disclosed in Schedule 3.10, no violation of any law, regulation or ordinance (including, without limitation, laws, regulations or ordinances relating to zoning, city planning or similar matters) relating to any of the properties or assets of the Company or its Subsidiary presently exists or has existed at any time since November 7, 1985, other than violations which have not had and would not reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect. Except as disclosed in Schedule 3.10, there are no developments affecting any Core Properties or any other properties or assets material to the conduct of the Business pending or, to the knowledge of the Company, threatened, which might materially detract from the value of such property or assets, materially interfere with any present or intended use of such property or assets or materially adversely affect the marketability of such properties or assets.

(g) As of January 1, 1989 the Company owned or otherwise controlled estimated proven and probable copper ore reserves as set forth in Schedule 3.10B. All such copper ore reserves are wholly within the Core Property. The estimates and conclusions contained in the report of M.A. Balcar and Associates, Inc. ("Balcar") dated February, 1989 have been reasonably determined and are based upon geologic, economic, engineering and other data supplied by the Company which is accurate. The Company knows of no fact or circumstance that, if such fact or circumstance had been known to Balcar at the time of preparing such report, could reasonably be expected to alter in any material respect the estimates or conclusions contained in such report. All information supplied by the Company to Buyer relating to the estimated proven and probable copper ore reserves owned or otherwise controlled by the Company is true and accurate and prepared in accordance with good mining practice, and the Company is not aware of any material information not supplied to Buyer relating to such reserves.

SECTION 3.11. No Undisclosed Material Liabilities. There are no liabilities of the Company or its Subsidiary of any kind whatsoever, whether accrued, contingent, absolute, determined, determinable or otherwise, and there is no existing condition, situation or set of circumstances which could reasonably be expected to result in such a liability, other than:

(i) liabilities disclosed or provided for in the Balance Sheet;

(ii) liabilities which, individually or in the aggregate, are not material to the Company or its Subsidiary, taken as a whole;

(iii) liabilities under this Agreement;

(iv) liabilities disclosed elsewhere in this Agreement (including the Schedules hereto);

(v) liabilities for expenses incurred in connection with the transactions contemplated hereby; and

(vi) liabilities incurred in the ordinary course since the Balance Sheet Date.

SECTION 3.12. Litigation. Except as set forth in Schedule 3.12, there is no action, suit, investigation or proceeding pending against, or to the knowledge of the Company threatened against or affecting, the Company or its Subsidiary or any of their respective properties before any court or arbitrator or any governmental body, agency or official which, if determined or resolved adversely to the Company or its Subsidiary, may reasonably be expected to have a Material Adverse Effect or which in any manner challenges or seeks to prevent, enjoin, alter or materially delay the Merger.

SECTION 3.13. Certain Business Activities. (a) There is no agreement, judgment, injunction, order, decree or other instrument binding upon the Company or its Subsidiary which has or is likely to have the effect of prohibiting any material business practice of the Company or its Subsidiary, any acquisition of property by the Company or its Subsidiary or the conduct of business by the Company or its Subsidiary.

(b) All metals inventory of the Company and its Subsidiary is either (i) usable, processable or salable in its current state or (ii) reprocessable with a commercial result after reprocessing charges. The values attributed to inventory in Schedule 3.13 reflect an appropriate reserve in accordance with generally accepted accounting principles.

(c) Except for matters reflecting the application of good mining practices, there is no fact or circumstance currently known to the Company or its Subsidiary which materially and adversely affects or in the future may, so far as can be reasonably foreseen, materially and adversely affect the production or rate of production of copper from the copper ore reserves identified on Schedule 3.10 excepting any fact or circumstance which may affect owners and/or producers generally of copper or silver in the State of Michigan.

(d) Neither the Company nor its Subsidiary has any reason, other than as disclosed in the Balcar report referred to in Section 3.10(f), to believe that there is a serious technical problem preventing commercial exploitation of the copper ore reserves identified on Schedule 3.10B.

(e) Except as disclosed on Schedule 3.13 or as a result of the Liens created under the Phibro Agreement and the Chemical Agreement, neither the Company nor its Subsidiary has assigned or in any other way restricted their respective rights to receive the proceeds from the sale of copper or silver produced from the copper ore reserves identified on Schedule 3.10B.

(f) Except as disclosed on Schedule 3.13, neither the Company nor its Subsidiary is obligated by virtue of a prepayment arrangement under any contract to which either of them is a party or by which either of them is bound to provide services at some future time without then or thereafter receiving full payment therefor at prices provided for in such contract.

(g) Neither the Company nor its Subsidiary has received any amount pursuant to "take or pay" or similar provisions in any production sales or development contracts applicable to production or sale of copper or silver to which either the Company or its Subsidiary is a party or by which either of them is bound and neither of them is obligated pursuant to any agreement or other commitment (other than the Phibro Agreement) to deliver copper or silver without then or thereafter receiving full payment therefor at prices provided for in such agreements.

SECTION 3.14. Taxes. Except as set forth in the Balance Sheet or on Schedule 3.14, (the representations herein relating to tax periods beginning before November 7, 1985 are to the best knowledge of the Company), (i) the Company and its Subsidiary have filed, been included in or sent, and will, prior to the Effective Time, file, be included in or send all returns, declarations and reports and information returns and statements required to be filed or sent by or relating to any of them prior to the Effective Time relating to any Taxes (as defined below) with respect to any income, properties or operations of the Company or its Subsidiary prior to the Effective Time (collectively, "Returns"); (ii) as of the time of filing, the Returns correctly reflected, in all material respects (and, as to any Returns not filed as of the date hereof, will correctly reflect, in all material respects) the facts regarding the income, business, assets, operations, activities and status of the Company and its Subsidiary or any other information required to be shown therein; (iii) the Company and its Subsidiary have timely paid or made provision for all Taxes that have been shown as due and payable on the Returns that have been filed; (iv) the Company and its Subsidiary have made or will make provision for all Taxes payable for any periods that end before the Effective Time for which no Returns have yet been filed; (v) the charges, accruals and reserves for Taxes reflected on the books of the Company and its Subsidiary are adequate to cover the Tax liabilities accruing or payable by the Company and its Subsidiary in respect of periods prior to the Effective Time in accordance with generally accepted accounting principles; (vi) neither the Company nor its Subsidiary is delinquent in the payment of any Tax or has requested any extension of time within which to file or send any Return, which Return has not since been filed or sent; (vii) neither the Company nor its Subsidiary (nor any member of any affiliated or combined group of which the Company or its Subsidiary is or has been a member) has granted any extension or waiver of the limitation period applicable to any Returns; (viii) there is no claim, audit, action, suit, proceeding, or investigation now pending or threatened against or with respect to the Company or its Subsidiary in respect of any Tax or assessment; (ix) there are no existing agreements or pending requests for rulings in respect of any Tax between the Company or its Subsidiary and any taxing authority; (x) neither the Company nor its Subsidiary owns any interest in real property in the State of New York; (xi) none of the property owned or used by the Company or its Subsidiary is subject to a tax benefit transfer lease executed in accordance with Section 168(f)(8) of the Internal Revenue Code of 1954, as amended by the Economic Recovery Tax Act of 1981; (xii) none of the property owned or used by the Company or its Subsidiary is subject to a lease, other than a "true" lease for federal income tax purposes; (xiii) there are no liens for Taxes upon the assets of the Company or its Subsidiary except liens for current Taxes not yet due; (xiv) no owner of Shares immediately prior to the Effective Time is subject to withholding under Section 1445 of the Code with respect to any transaction contemplated hereby; (xv) neither the Company nor its Subsidiary will be required, as a result of a change in method of accounting for any period including or ending prior to the Effective Time, to include any adjustment under Section 481(c) of the Code in Taxable income for any such period; (xvi) neither the Company nor its Subsidiary has been a member of an affiliated group other than one of which the Company was the common parent, or filed or been included in a combined, consolidated or unitary Return together other than one filed by the Company; (xvii) neither the Company nor its Subsidiary is currently under any contractual obligation to indemnify any other party with respect to Taxes; (xviii) as of December 31, 1988, the Company and its Subsidiary had not less than $20 million in net operating losses ("NOLs"), as defined in Section 172(c) of the Code, fully available at that time to offset Taxable income of either the Company or the Subsidiary, which NOLs shall not begin to expire until December 31, 1999, and shall fully expire by December 31, 2003 and (xix) all Returns filed with respect to Taxable years of the Company and its Subsidiary through the Taxable year ended December 31, 1977 have been examined and closed or are Returns with respect to which the applicable period for assessment under applicable law, after giving effect to extensions or waivers has expired. "Tax" (and, with correlative meaning, "Taxes" and "Taxable") means (A) any net income, alternative or add-on minimum tax, gross income, gross receipts, sales, use, ad valorem, franchise, profits, license, withholding on amounts paid to or by the Company or its Subsidiary, payroll, employment, excise, severance, stamp, occupation, premium, property, environmental or windfall profit tax, custom, duty or other tax, governmental fee or other like assessment or charge of any kind whatsoever, together with any interest or any penalty, addition to tax or additional amount imposed by any governmental authority (a "Taxing Authority") responsible for the imposition of any such tax (domestic or foreign), (B) liability of the Company or its Subsidiary for the payment of any amounts of the type described in (A) as a result of being a member of an affiliated, consolidated, combined or unitary group for any period including or ending prior to the Effective Time and (C) liability of the Company or its Subsidiary for the payment of any amounts of the type described in (A) as a result of any express or implied obligation to indemnify any other Person.

SECTION 3.15. ERISA. (a) The Company has provided Buyer with a list identifying each "employee benefit plan", as defined in Section 3(3) of the Employee Retirement Income Security Act of 1974 ("ERISA"), which (i) is subject to any provision of ERISA and (ii) is maintained, administered or contributed to by the Company or any affiliate (as defined below) and (iii) covers any employee or former employee of the Company or any affiliate and under which the Company or any affiliate has any liability. Copies of such plans (and, if applicable, related trust agreements) and all amendments thereto and written interpretations thereof have been furnished to Buyer together with (i) the three most recent annual reports (Form 5500 including, if applicable, Schedule B thereto) prepared in connection with any such plan and (ii) the most recent actuarial valuation report prepared in connection with any such plan, if applicable. Such plans are hereinafter referred to collectively as the "Employee Plans". For purposes of this Section 3.15, "affiliate" of any Person means any other Person directly or indirectly controlling, controlled by or under common control with such Person. The only Employee Plans which individually or collectively would constitute an "employee pension benefit plan" as defined in Section 3(2) of ERISA (the "Pension Plans") are identified as such in the list referred to above.

(b) No Employee Plan constitutes a "multiemployer plan", as defined in Section 3(37) of ERISA, and no Employee Plan is maintained in connection with any trust described in Section 501(c)(9) of the Code. The only Employee Plans that are subject to Title IV of ERISA (the "Retirement Plans") are identified in the list of such Plans heretofore provided to Buyer by the Company. As of December 31, 1988, the fair market value of the assets of each Retirement Plan (excluding for these purposes any accrued but unpaid contributions) exceeded the present value of all benefits accrued under such Retirement Plan determined on a termination basis using the assumptions established by the Pension Benefit Guaranty Corporation (the "PBGC") as in effect on such date. To the best knowledge of the Company, no "prohibited transaction" as defined in Section 406 of ERISA or Section 4975 of the Code, has occurred with respect to any Employee Plan or any other employee benefit plan or arrangement contributed to by the Company or any affiliate which is covered by Title I of ERISA, excluding transactions effected pursuant to a statutory or administrative exemption which could subject the Company to a material liability. None of the transactions contemplated by this Agreement, including, without limitation, the satisfaction of the conditions contained in clause (xii) of Section 8.02 will constitute such a prohibited transaction or cause such a prohibited transaction to occur. No "accumulated funding deficiency", as defined in Section 412 of the Code, has been incurred with respect to any Pension Plan, whether or not waived. No "reportable event", within the meaning of Section 4043 of ERISA, and no event described in Sections 4041, 4042, 4062, 4063 or 4064 of ERISA has occurred in connection with any Employee Plan, other than a "reportable event" for which the 30 day notice requirement has been waived by the PBGC. To the best knowledge of the Company, no condition exists and no event has occurred that could constitute grounds for termination of any Retirement Plan and neither the Company nor any of its affiliates has incurred any material liability under Title IV of ERISA arising in connection with the termination of, or complete or partial withdrawal from, any plan covered or previously covered by Title IV of ERISA. To the best knowledge of the Company, neither the Company nor any of its affiliates has engaged in, or is a successor to an entity that has engaged in a transaction described in Section 4069 of ERISA. Neither the Company nor any of its affiliates has incurred any material liability under Title IV of ERISA arising in connection with the termination of any plan covered or previously covered by Title IV of ERISA. To the best knowledge of the Company, nothing done or omitted to be done and no transaction or holding of any asset under or in connection with any Employee Plan has or will make the Company or its Subsidiary, any officer or director of the Company or its Subsidiary subject to any material liability under Title I of ERISA or liable for any tax pursuant to Section 4975 of the Code.

(c) Except as otherwise disclosed, each Employee Plan which is intended to be qualified under Section 401(a) of the Code is so qualified and has been so qualified during the period from its adoption to date, and each trust forming a part thereof is exempt from tax pursuant to Section 501(a) of the Code. Except as otherwise disclosed, the Company has furnished to Buyer copies of the most recent Internal Revenue Service determination letters with respect to any such Plans. Except as otherwise disclosed, each Employee Plan has been maintained in material compliance with its terms and with the requirements prescribed by any and all statutes, orders, rules and regulations, including but not limited to ERISA and the Code, which are applicable to such Plans.

(d) There is no contract, agreement, plan or arrangement covering any employee or former employee of the Company or any affiliate that, individually or collectively, could give rise to the payment of any amount that would not be deductible pursuant to the terms of Section 280G or Section 162(a)(1) of the Code or would give rise to a penalty under Section 4980B of the Code.

(e) The Company has provided Buyer with a list of each employment, severance or other similar contract, arrangement or policy and each plan or arrangement (written or oral) providing for insurance coverage (including any self-insured arrangements), workers' compensation, disability benefits, supplemental unemployment benefits, vacation benefits, retirement benefits or for deferred compensation, profit-sharing, bonuses, stock options, stock appreciation or other forms of incentive compensation or post-retirement insurance, compensation or benefits which (i) is not an Employee Plan, (ii) is entered into, maintained or contributed to, as the case may be, by the Company or any of its affiliates and (iii) covers any employee or former employee of the Company or any of its affiliates. Such contracts, plans and arrangements as are described above, copies or descriptions of all of which have been furnished previously to Buyer are hereinafter referred to collectively as the "Benefit Arrangements". Each Benefit Arrangement has been maintained in substantial compliance with its terms and with the requirements prescribed by any and all statutes, orders, rules and regulations which are applicable to such Benefit Arrangement.

(f) Neither the Company nor its Subsidiary has any current or projected liability in respect of post-retirement health and medical benefits for retired employees of the Company or its Subsidiary. Except as set forth on Schedule 3.15, no condition exists that would prevent the Company or its affiliates from amending or terminating any Employee Plan or Benefit Arrangement in either case which provides health or medical benefits in respect of any active employees of the Company or any of its affiliates, other than any limitation imposed under the terms of a collective bargaining agreement.

(g) Except as disclosed in writing to Buyer prior to the date hereof and as contemplated by this Agreement, there has been no amendment to, written interpretation or announcement (whether or not written) by the Company or any of its affiliates relating to, or change in employee participation or coverage under, any Employee Plan or Benefit Arrangement which would increase materially the expense of maintaining such Employee Plan or Benefit Arrangement above the level of the expense incurred in respect thereof for the fiscal year ended on the Balance Sheet Date.

(h) The Copper Range Company Employee Stock Ownership Plan (the "Old ESOP") is an employee stock ownership plan within the meaning of Section 4975(e)(7) of the Code. None of the transactions contemplated by this Agreement will jeopardize the qualification of the Old ESOP under Section 401 of the Code.

SECTION 3.16. Material Contracts. (a) Except for agreements, contracts, plans, leases, arrangements or commitments disclosed in Schedule 3.16 or disclosed to Buyer pursuant to Section 3.15, neither the Company nor its Subsidiary is a party to or subject to:

(i) any collective bargaining, union or other labor agreement or any employment contract or arrangement, written or oral, express or implied, with any officer, consultant, director or employee of the Company or its Subsidiary;

(ii) any lease or other interest in property providing for annual rentals or royalty payments of $50,000 or more;

(iii) any contract for the purchase of equipment, materials or supplies or for construction providing for payments by or to the Company or its Subsidiary of $250,000 or more;

(iv) any sales, distribution or other similar agreement providing for the sale by the Company or its Subsidiary of materials, supplies, goods, services or equipment and providing for annual payments to the Company or its Subsidiary of $50,000 or more;

(v) any partnership, joint venture, or other similar contract arrangement or agreement;

(vi) any contract or agreement to sell forward, any commitment to forward sales of, or any options contract for the purchase or sale of, copper or silver or other minerals, other than any such contract that the Company enters into at Buyer's request;

(vii) any contract relating to indebtedness for borrowed money or the deferred purchase price of property (whether incurred, assumed, guaranteed or secured by any asset), except for the Phibro Agreement and the Chemical Agreement and contracts relating to indebtedness incurred in the ordinary course of business in an amount not exceeding $50,000;

(viii) any material license agreements, franchise agreements or agreements in respect of similar rights granted to or held by the Company or its Subsidiary;

(ix) any agency, dealer, sales representative or other similar agreement;

(x) any contract or other document that substantially limits the freedom of the Company to compete in any line of business or with any Person or in any area or which would so limit the freedom of the Surviving Corporation after the Effective Time;

(xi) any contract, commitment or agreement between the Company or the Subsidiary and any of their affiliates or between the Company or the Subsidiary and any officer, director or employee of any of the Company or the Subsidiary; or

(xii) any other contract or commitment not made in the ordinary course of business which is material to the Company and its Subsidiary taken as a whole.

(b) All agreements, contracts, plans, leases, arrangements and commitments disclosed or required to be disclosed pursuant to Section 3.15 or 3.16 or which are otherwise material to the Company and its Subsidiary taken as a whole are valid and binding agreements of the Company or its Subsidiary, are in full force and effect, and neither the Company, its Subsidiary, nor, to the knowledge of the Company, any other party thereto is in default in any material respect under the terms of any such agreement, contract, plan, lease, arrangement or commitment.

SECTION 3.17. Licenses. Except as set forth on Schedule 3.17, the Company and its Subsidiary have all licenses, franchises, permits and other similar authorizations material to the conduct of the Business and the Company and its Subsidiary are, to the best of their knowledge, in good standing under each thereof and the conditions of grant thereof and the operation of the Business does not violate any of such licenses, franchises, permits and other similar authorizations (excepting any violations which, individually or in the aggregate, do not have a Material Adverse Effect). No material license, franchise, permit or other similar authorization held by the Company or its Subsidiary will be terminated or impaired as a result of the transactions contemplated by this Agreement.

SECTION 3.18. Insurance. The Company has furnished to Buyer a list of, and true and complete copies of, all insurance policies and fidelity bonds in effect now or at any time since November 7, 1985 covering the assets, business, equipment, properties, operations, employees, officers and directors of the Company and its Subsidiary. There is no material claim by the Company or its Subsidiary pending under any of such policies or bonds as to which coverage has been questioned, denied or disputed by the underwriters of such policies or bonds. All premiums payable under all such policies and bonds have been paid and the Company and its Subsidiary are otherwise in full compliance with the terms and conditions of all such policies and bonds. Those of such policies and bonds which are currently in effect are of the type and in amounts customarily carried by Persons conducting businesses similar to those of the Company and its Subsidiary. Neither the Company nor the Subsidiary knows of any threatened termination of, or premium increase with respect to, any of such policies or bonds which are currently in effect.

SECTION 3.19. Compliance with Laws. Except for violations which do not have and could not reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect, neither the Company nor its Subsidiary is in violation of, any applicable provisions of any laws, statutes, ordinances or regulations.

SECTION 3.20. Finders' Fees. Except for Nils Kindwall and Lazard Freres & Co., there is no investment banker, broker, finder or other intermediary which has been retained by or is authorized to act on behalf, of the Company or its Subsidiary and, to the knowledge of the Company and its Subsidiary, there is no investment banker, broker, finder or other intermediary which might be entitled to any fee or commission from Buyer, the Company or any of their respective affiliates upon consummation of the transactions contemplated by this Agreement.

SECTION 3.21. Patents, Trademarks, etc. (a) The Company has delivered to Buyer a list of all inventions which are the subject of issued letters patent or an application therefor, all trade and service marks which have been registered or for which an application for registration is pending and all writings for which a claim for copyright had been recorded or is pending, in each case which are owned and used or held for use by the Company or its Subsidiary and which are material to the Business (the "Patent Rights"), specifying as to each, as applicable: (i) the nature of such Patent Right; (ii) the owner of such Patent Right; (iii) the jurisdictions by or in which such Patent Right has been issued or registered or in which an application for such issuance or registration has been filed, including the respective registration or application numbers; and (iv) material licenses, sublicenses and other agreements as to which the Company or any of its affiliates is a party and pursuant to which any Person is authorized to use such Patent Right including the identity of all parties thereto, a description of the nature and subject matter thereof, the applicable royalty and the term thereof. The Company or its Subsidiary is the sole and exclusive owner of, with all right, title and interest in and to (free and clear of any Lien), the Patent Rights described in such list and has sole and exclusive rights (without being contractually obligated to pay any compensation to any third party in respect thereof) to the use thereof or the material covered thereby in connection with the services or products in respect of which they are being used.

(b) Neither the Company nor its Subsidiary (i) during the three years preceding the date of this Agreement has been sued or charged in writing with or been a defendant in any claim, suit, action or proceeding relating to its business which has not been finally terminated prior to the date hereof and which involves a claim of infringement of any patents, trademarks, service marks or copyrights, (ii) has knowledge of any such charge or claim or (iii) has knowledge of any infringement by any other Person of any of the Patent Rights. No Patent Right is subject to any outstanding order, judgment, decree, stipulation or agreement restricting the use thereof by the Company or its Subsidiary or restricting the licensing thereof by the Company or its Subsidiary to any Person. Neither the Company nor its Subsidiary has entered into any agreement to indemnify any other Person against any charge of infringement of any patent, trademark, service mark or copyright.

(c) None of the processes and formulae, research and development results and other know-how of the Company or its Subsidiary, the value of which to the Company or its Subsidiary is material to the business or operations of the Company or its Subsidiary and is contingent upon maintenance of the confidentiality thereof, has been disclosed by the Company or its Subsidiary to any Person other than employees, representatives and agents of the Company or its Subsidiary and certain government agencies.

SECTION 3.22. Environmental and Other Regulatory Matters. (a) Except as disclosed on Schedule 3.22, no written or oral notice, notification, demand, request for information, citation, summons or order has been given or issued, no complaint has been filed, no material penalty has been assessed and, to the knowledge of the Company, no investigation or review is pending or threatened by any governmental or other entity (i) with respect to any alleged violation by the Company or its Subsidiary of any law, ordinance, rule, regulation or order of any governmental entity or (ii) with respect to any alleged failure by the Company or its Subsidiary to have any permit, certificate, license, approval, registration or authorization material to the conduct of the Business or (iii) with respect to any generation, treatment, storage, recycling, transportation or disposal or release, as defined in 42 USC Section 9601(22) ("Release") of any toxic, caustic or otherwise hazardous substance, including petroleum, its derivatives, by-products and other hydrocarbons, regulated under federal, state or local environmental statutes, ordinances, rules, regulations or orders ("Hazardous Substance") generated by the Company or its Subsidiary.

(b) The Parent and Buyer acknowledge that the Company has disclosed that (i) asbestos is present on the property owned or leased by the Company and (ii) in the ordinary course of mining, processing and refining copper and other metals, Hazardous Substances are Released in quantities that subject the Company to environmental laws and regulations, Hazardous Substances are stored on property owned or leased by the Company, and polychlorinated biphenyls and urea formaldehyde are and have been used on the property owned or leased by the Company. The Company is in compliance with all currently applicable environmental laws and regulations relating to the matters set forth in clauses (i) and (ii) in the immediately preceding sentence. The Buyer and Parent further acknowledge that the Company has delivered to it the environmental compliance report dated January 1989, prepared for Chemical Bank by Balcar. The Company is not aware of any fact or circumstances which, if such fact or circumstance had been known to Balcar at the time of preparing such report, could reasonably be expected to alter in any material respect the conclusions contained in such report.

(c) To the best knowledge of the Company and its Subsidiary, except as disclosed on Schedule 3.22, neither the Company nor its Subsidiary has transported, disposed or arranged for the transportation or disposal (directly or indirectly) of any Hazardous Substance to or at any location which is listed or proposed for listing under the Comprehensive Environmental Responses, Compensation and Liability Act of 1980, as amended ("CERCLA"), CERCLIS (as defined in CERCLA) or on any similar state list or which is the subject of federal, state or local enforcement actions or other investigations which may lead to claims against the Company or its Subsidiary for response costs, investigative costs, clean-up costs, remedial work, damages to natural resources or for personal injury claims arising from violations of environmental laws, including, but not limited to, claims under CERCLA.

(d) No oral or written notification of a Release of a Hazardous Substance has been filed by or on behalf of the Company or its Subsidiary and, to the knowledge of the Company, no property now or previously owned or leased by the Company or its Subsidiary is listed or proposed for listing, on the National Priorities List promulgated pursuant to CERCLA, on CERCLIS or any similar state list of sites requiring investigation or clean-up. To the knowledge of the Company, no property now or previously owned or leased by the Company or its Subsidiary is the subject of federal, state or local enforcement actions or other investigations which may lead to claims against the Company or its Subsidiary for response costs, investigative costs, remedial work or investigative work, for damages to natural resources or for personal injury claims arising from violations of environmental laws.

(e) There are no environmental Liens on any of the Real Property or other properties owned or leased by the Company or its Subsidiary, and, to the knowledge of the Company, no government actions have been taken or are in process which could subject any of such properties to such Liens and the Company or its Subsidiary would not be required to place any notice or restriction relating to the presence of Hazardous Substances at any property owned by either of them in any deed to such property.

(f) The Company and its Subsidiary and their respective properties are in compliance with all currently applicable requirements of United States federal, state and local laws relating to environmental matters, including, without limitation, the Michigan Air Pollution Act, the Michigan Water Resources Commission Act, the United States Clean Air Act, the United States Resource Conservation and Recovery Act and the United States Clean Water Act, except for any failures to comply which, individually or in the aggregate, could not reasonably be expected to have a Material Adverse Effect.

(g) Except as set forth on Schedule 3.22, there are no federal, state or local statutes, ordinances, rules, regulations or orders relating to environmental matters requiring any material work, repairs, construction or capital expenditures in order to achieve or maintain compliance with currently applicable environmental laws with respect to the Core Properties.

(h) Except as set forth on Schedule 3.22, there have been no environmental investigations, studies, audits, tests, reviews or other analyses conducted by or which are in the possession of the Company or its Subsidiary in relation to any property or facility now or previously owned or leased by the Company or its Subsidiary.

(i) The parties hereto acknowledge that for purposes of this Section 3.22, the terms "Company" and "Subsidiary" (other than as used in the phrase "to the best knowledge of the Company") include such entities' predecessors in interest, whether by merger, acquisition or otherwise by operation of law or by agreement.

SECTION 3.23. Certain Receivables. Except as set forth on Schedule 3.23, on or prior to the Effective Time, the Company and its Subsidiary will have collected all amounts, if any, loaned or advanced to or receivable from their respective directors, officers or shareholders or any affiliates thereof.

SECTION 3.24. Comex Certification. The copper produced by the Company is currently certified with the Commodity Exchange, Inc. ("COMEX"); the Company is in full compliance with all COMEX rules and standards applicable to contracts for copper; and the Company has received no notice and has no reason to believe that the copper produced by the Company will not continue to be certified for COMEX contracts.

SECTION 3.25. Other Information. The documents or information taken as a whole delivered to Buyer in connection with the transactions contemplated by this Agreement do not contain any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements contained therein not misleading. There are no facts or circumstances known to the Company or its Subsidiary and not disclosed to Buyer which the Company believes might have a Material Adverse Effect.

ARTICLE IV

REPRESENTATIONS AND WARRANTIES OF PARENT AND BUYER

Parent and Buyer each represents and warrants to the Company that:

SECTION 4.01. Corporate Existence and Power. Each of Parent, Buyer and Merger Subsidiary is a corporation duly incorporated, validly existing and in good standing under the laws of its jurisdiction of incorporation and has all corporate powers and all material governmental licenses, authorizations, consents and approvals required to carry on its business as now conducted. Since the date of its incorporation, Merger Subsidiary has not engaged in any activities other than in connection with or as contemplated by this Agreement or in connection with arranging any financing required to consummate the transactions contemplated hereby. True and complete copies of the certificate of incorporation and bylaws of Merger Subsidiary as currently in effect are attached hereto as Exhibit A.

SECTION 4.02. Corporate Authorization. The execution, delivery and performance by Parent, Buyer and Merger Subsidiary of this Agreement and the consummation by Buyer and Merger Subsidiary of the transactions contemplated hereby are within the corporate powers of Parent, Buyer and Merger

Subsidiary and have been duly authorized by all necessary corporate action. This Agreement constitutes a valid and binding agreement of Parent, Buyer and Merger Subsidiary.

SECTION 4.03. Governmental Authorization; Consents. (a) The execution, delivery and performance by Parent, Buyer and Merger Subsidiary of this Agreement and the consummation by Parent, Buyer and Merger Subsidiary of the transactions contemplated by this Agreement require no action by or in respect of, or filing with, any governmental body, agency, official or authority other than (i) the filing of a certificate of merger in accordance with Delaware Law and (ii) compliance with any applicable requirements of the HSR Act.

(b) No consent, approval, waiver or other action by any person (other than the governmental authorities referred to in (a) above) under any contract, agreement, indenture, lease, instrument or other document to which Parent, Buyer or Merger Subsidiary is a party or by which either of them is bound is required or necessary for the execution, delivery and performance of this Agreement by Parent, Buyer or Merger Subsidiary or the consummation of the transactions contemplated hereby.

SECTION 4.04. Disclosure Documents. The information with respect to Parent and its subsidiaries that Parent furnishes to the Company in writing specifically for use in the Company Information Statement will not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in the light of the circumstances under which they were made, not misleading at the time the Company Information Statement or any amendment or supplement thereto is first mailed to stockholders of the Company, at the time the stockholders vote on adoption of this Agreement and at the Effective Time.

SECTION 4.05. Finders' Fees. Except for Burns Fry Limited, whose fees will be paid by Buyer, there is no investment banker, broker, finder or other intermediary who might be entitled to any fee or commission from the Company or any of its affiliates upon consummation of the transactions contemplated by this Agreement.

ARTICLE V

COVENANTS OF THE COMPANY

The Company agrees that:

SECTION 5.01. Conduct of the Company. (a) From the date hereof until the Effective Time, the Company and its Subsidiary shall conduct their business in the ordinary course consistent with past practice and shall use their best efforts to preserve intact their business organizations and relationships with third parties and to keep available the services of their present officers and employees. Without limiting the generality of the foregoing, from the date hereof until the Effective Time:

(i) the Company will not, and will not permit its Subsidiary to, adopt or propose any change in its certificate of incorporation or bylaws;

(ii) the Company will not, and will not permit its Subsidiary to, merge or consolidate with any other Person, acquire any stock or other ownership interest in any Person, acquire a material amount of assets of any other Person or liquidate, dissolve or otherwise reorganize or seek protection from its creditors;

(iii) the Company will not, and will not permit its Subsidiary to, sell, lease, license or otherwise dispose of any material assets or property except (A) pursuant to existing contracts or commitments and (B) in the ordinary course consistent with past practice;

(iv) with respect to Taxable years ending on or before the Effective Time, the Company will not, and will not permit its Subsidiary, to (A) make any election with respect to any Tax that would materially adversely affect Buyer or the Company and its Subsidiary, (B) change its annual accounting period within the meaning of Section 442 of the Code or (C) change any method of accounting within the meaning of Section 446 of the Code in a manner that would adversely affect Buyer or the Company and its Subsidiary;

(v) the Company will not, and will not permit any Subsidiary to, agree or commit to do any of the foregoing; and

(vi) the Company will not, and will not permit any Subsidiary to take or agree or commit to take any action that would make any material representation and warranty of the Company hereunder inaccurate in any material respect at, or as of any time prior to, the Effective Time.

(b) From the date hereof until the Effective Time, the Company shall operate its mine and mill in good faith and use its best efforts, consistent with good mining practice, to achieve the projections set forth in the 1989 Mining Plan.

SECTION 5.02. Stockholder Meeting; Information Statement. The Company shall cause a meeting of its stockholders (the "Company Stockholder Meeting") to be duly called and held as soon as reasonably practicable for the purpose of voting on the approval and adoption of this Agreement and the Merger. The Directors of the Company shall, subject to their fiduciary duties as advised in writing by Arnold & Porter, counsel to the Company, recommend approval and adoption of this Agreement and the Merger by the Company's stockholders. In connection with such meeting, the Company (i) will prepare and mail to its stockholders as promptly as practicable the Company Information Statement and all other materials for such meeting, (ii) will use its best efforts to obtain the necessary approvals by its stockholders of this Agreement and the transactions contemplated hereby and (iii) will otherwise comply with all legal requirements applicable to such meeting.

SECTION 5.03. Access to Information. From the date hereof until the Effective Time, the Company will, during normal business hours and on reasonable advance notice, give Buyer, its counsel, financial advisors, auditors and other authorized representatives full access to the offices, properties, books and records of the Company and its Subsidiary, will furnish to Buyer, its counsel, financial advisors, auditors and other authorized representatives such financial and operating data and other information as such persons may reasonably request and will instruct the Company's employees, counsel and financial advisors to cooperate with Buyer in its investigation of the business of the Company and its Subsidiary.

SECTION 5.04. Other Offers. (a) From the date hereof until the termination hereof, the Company and its Subsidiary and the officers, directors, employees or other agents of the Company and its Subsidiary will not, directly or indirectly, (i) take any action to solicit, initiate or encourage any Acquisition Proposal (as hereinafter defined) or (ii) subject to the fiduciary duties of the Board of Directors under applicable law as advised in writing by Arnold & Porter, counsel to the Company, engage in negotiations with, or disclose any nonpublic information relating to the Company or its Subsidiary or afford access to the properties, books or records of the Company or its Subsidiary to, any Person that may be considering making, or has made, an Acquisition Proposal. The Company will promptly notify Buyer after receipt of any Acquisition Proposal or any indication that any person is considering making an Acquisition Proposal or any request for nonpublic information relating to the Company or its Subsidiary or for access to the properties, books or records of the Company or its Subsidiary by any Person that may be considering making, or has made, an Acquisition Proposal and, subject to the fiduciary duties of the Board of Directors under applicable law as advised in writing by Arnold & Porter, counsel to the Company, will keep Buyer fully informed of the status and details of any such Acquisition Proposal, indication or request. The term "Acquisition Proposal" as used herein means any offer or proposal for, or any indication of interest in, a merger or other business combination involving the Company or any Subsidiary or the acquisition of any equity interest in, or a substantial portion of the assets of, the Company or its Subsidiary, other than the transactions contemplated by this Agreement. The Company will, and will cause its Subsidiary to, terminate any existing discussions or negotiations with any Person (other than Buyer) relating to any Acquisition Proposal.

SECTION 5.05. Notices of Certain Events. The Company shall promptly notify Buyer of:

(i) any notice or other communication from any Person alleging that the consent of such Person is or may be required in connection with the transactions contemplated by this Agreement;

(ii) any notice or other communication from any governmental or regulatory agency or authority in connection with the transactions contemplated by this Agreement; and

(iii) any actions, suits, claims, investigations or proceedings commenced or, to the best of its knowledge threatened against, relating to or involving or otherwise affecting the Company or its Subsidiary which, if pending on the date of this Agreement, would have been required to have been disclosed pursuant to Section 3.12 or which relate to the consummation of the transactions contemplated by this Agreement.

SECTION 5.06. Confidentiality. The Company will hold, and will cause its Subsidiary to hold, and will use its best efforts to cause the officers, directors, employees, consultants, advisors, counsel and agents of the Company and its Subsidiary to hold, in confidence, unless compelled to disclose by judicial or administrative process or by other requirements of law, all confidential documents and information concerning Parent and its subsidiaries furnished to the Company or its Subsidiary in connection with the transactions contemplated by this Agreement, except to the extent that such information can be shown to have been (i) previously known on a nonconfidential basis by the Company, (ii) in the public domain through no fault of the Company or its Subsidiary or (iii) later lawfully acquired by the Company from sources other than Parent or Buyer; provided that the Company may disclose such information to its officers, directors, employees, consultants, advisors and agents in connection with the transactions contemplated by this Agreement so long as such persons are informed by the Company of the confidential nature of such information and are directed by the Company to treat such information confidentially. The Company's obligation to hold such information in confidence shall be satisfied if it exercises the same care with respect to such information as it would exercise to preserve the confidentiality of its own similar information. If this Agreement is terminated, such confidence shall be maintained and the Company will, and will cause its Subsidiary and will use its best efforts to cause its and its Subsidiary's respective officers, directors, employees, consultants, advisors, counsel and agents to, destroy or deliver to Parent, upon request, all documents and other materials, and all copies thereof, obtained by or on behalf of any such person from Parent or Buyer in connection with this Agreement that are subject to such confidence.

SECTION 5.07. Approval for Termination of the Old ESOP. The Company agrees to use its best efforts to obtain prior to the Effective Time the necessary approval of the Old

ESOP participants in order to permit the termination of the Old ESOP.

SECTION 5.08. New ESOP and Excess Benefit Plan. The Company agrees to adopt on or prior to the Effective Time an eligible individual account plan effective as of the Effective Time, intended to be qualified within the meaning of Section 401(a) of the Code and designed to invest in the Class A stock of the Surviving Corporation, in the form set forth in Exhibit B hereto (the "New ESOP"). The Company agrees to adopt on or prior to the Effective Time an excess benefit plan effective as of the Effective Time in the form set forth in Exhibit J hereto (the "Excess Benefit Plan").

ARTICLE VI

COVENANTS OF PARENT AND BUYER

Each of Parent and Buyer agrees that:

SECTION 6.01. Confidentiality. Prior to the Effective Time and after any termination of this Agreement each of Parent and Buyer will hold, and will use its best efforts to cause its respective officers, directors, employees, accountants, counsel, consultants, advisors and agents to hold, in confidence, unless compelled to disclose by judicial or administrative process or by other requirements of law, all confidential documents and information concerning the Company and its Subsidiary furnished to Parent or Buyer in connection with the transactions contemplated by this Agreement, except to the extent that such information can be shown to have been (i) previously known on a nonconfidential basis by Parent or Buyer, (ii) in the public domain through no fault of Parent or Buyer or (iii) later lawfully acquired by Parent or Buyer from sources other than the Company; provided that Parent and Buyer may disclose such information to their officers, directors, employees, accountants, counsel, consultants, advisors and agents in connection with the transactions contemplated by this Agreement and to their lenders in connection with obtaining the financing for the transactions contemplated by this Agreement so long as such persons are informed by Parent or Buyer of the confidential nature of such information and are directed by Parent or Buyer to treat such information confidentially. Parent's and Buyer's obligation to hold any such information in confidence shall be satisfied if it exercises the same care with respect to such information as it would take to preserve the confidentiality of its own similar information. If this Agreement is terminated, Parent and Buyer will, and will use their best efforts to cause their respective officers, directors, employees, accountants, counsel, consultants, advisors and agents to, destroy or deliver to the Company, upon request, all documents and other materials, and all copies thereof, obtained by Parent or Buyer or on their behalf from the Company in connection with this Agreement that are subject to such confidence.

SECTION 6.02. Obligations of Merger Subsidiary. Buyer will take all action necessary to cause Merger Subsidiary to perform its obligations under this Agreement and to consummate the Merger on the terms and conditions set forth in this Agreement. Buyer will not cause or permit Merger Subsidiary to take any action to amend its certificate of incorporation or bylaws prior to the Effective Time without the Company's consent.

SECTION 6.03. New Employee Stock Ownership Plan. The Buyer shall cause the Surviving Corporation to apply for a determination letter from the Internal Revenue Service that the New ESOP is qualified under Section 401(a) of the Code as soon as practicable following the Effective Time. Buyer shall cause the Surviving Corporation to make amendments to the New ESOP as may be necessary to obtain such determination letter from the Internal Revenue Service and to comply with any and all applicable laws, regulations or governmental orders. If the Surviving Corporation does not receive a determination letter from the IRS that the New ESOP is qualified under Section 401(a) of the Code within 18 months following the Effective Time, Buyer shall not be under any obligation to cause the Surviving Corporation to continue to maintain the New ESOP and shall cause the Surviving Corporation to compensate those persons who would have been participants in the New ESOP in a manner which provides such participants with benefits of similar value and at a similar cost to the Surviving Corporation.

SECTION 6.04. Payment to the Old ESOP Participants; Special Payments. (a) Buyer agrees to cause the Surviving Corporation to pay to the Old ESOP participants as of December 31, 1988, on the basis of the number of shares of Company Common Stock allocated to their accounts in the Old ESOP at the Effective Time, a cash bonus equal to the amount of principal plus unpaid interest outstanding on the ESOP Loan at the Effective Time less the amount of any payments to be made under subsection (b) below; provided that any payments to a participant represented by the United

Steelworkers of America (the "USWA") may be reduced, if required by the amended collective bargaining agreement to be entered into between the Surviving Corporation and the USWA, by the amount of any checkoff dues owed by such participant to the USWA.

(b) Buyer agrees to cause the Surviving Corporation to pay at the Effective Time up to an aggregate of $200,000 to persons and in amounts both as designated by the Company's Board of Directors prior to the Effective Time in recognition of certain hardship cases relating to present or former employees and their families.

SECTION 6.05. Officers and Directors of the Surviving Corporation. (a) Prior to the Effective Time, Parent and Buyer shall designate the senior officer of the Surviving Corporation who will reside in the vicinity of White Pine, Michigan. Such officer shall be acceptable to the current directors of the Company who are nominees of its employees. Such officer will have the title "General Manager" and will assume the responsibilities of such office within 60 days after the Effective Time.

(b) Prior to the Effective Time, Parent and Buyer shall also designate a new chief executive officer and a new chief financial officer of the Surviving Corporation.

(c) Parent and Buyer shall cause the board of directors of Merger Subsidiary immediately prior to the Effective Time to be comprised of six members designated by the Buyer and five members designated by the Company.

SECTION 6.06. Payment under Cash Bonus Plan. If the Effective Date shall have occurred on or prior to May 15, 1989, Parent and Buyer shall cause the Surviving Corporation to pay on May 15, 1989 to each person who was an employee of the Company during the six month period ending on March 31, 1989 any cash bonus to which he or she is entitled under the Copper Range Company Cash Bonus Plan as in effect during such period.

SECTION 6.07. Payment of Dividends. In the event that the Surviving Corporation declares a dividend on any class of securities with respect to calendar year 1989, Buyer and Parent agree to cause the Surviving Corporation to make cash payments to participants in the New ESOP in an amount equal to the difference between (a) the dividend paid in respect of the number of shares of Class A Stock contributed to the New ESOP in accordance with Section 4(d) of the New

ESOP on the record date of the dividend and (b) the dividend that would have been paid if the shares contributed under Section 4(d) of the New ESOP as of the Effective Time had been based on total hours worked, as defined in the New ESOP, in 1989. Such amount shall be paid as soon as practicable following the allocation of the contributions (in accordance with Section 6 of the New ESOP) for 1989 and shall be paid to each participant pro rata based upon such participant's account balance as of December 31, 1989.

ARTICLE VII

COVENANTS OF PARENT, BUYER AND THE COMPANY

The parties hereto agree that:

SECTION 7.01. Best Efforts. Subject to the terms and conditions of this Agreement, each party will use its best efforts to take, or cause to be taken, all actions and to do, or cause to be done, all things necessary, proper or advisable under applicable laws and regulations to consummate the transactions contemplated by this Agreement on or before March 31, 1989, or, if the Effective Time shall not then have occurred, as soon as practicable thereafter. Notwithstanding the foregoing, neither Parent nor Buyer shall be required to take any action or agree to any condition that might, in its reasonable judgment, have a Material Adverse Effect or materially adversely effect the business, financial condition, results of operations, competitive position or reputation of Parent and its subsidiaries.

SECTION 7.02. Certain Filings. The Company, Parent and Buyer shall cooperate with one another (i) in connection with the preparation of the Company Information Statement (which the Parent and Buyer shall have the right to review and comment on), (ii) in determining whether any action by or in respect of, or filing with, any governmental body, agency or official, or authority is required, or any actions, consents, approvals or waivers are required to be obtained from parties to any material contracts, in connection with the consummation of the transactions contemplated by this Agreement, (iii) in seeking any such actions, consents, approvals or waivers or making any such filings, furnishing information required in connection therewith or with the Company Information Statement and seeking timely to obtain any such actions, consents, approvals or waivers, and

(iv) in preparing an application for a determination letter from the IRS as to the qualification of the New ESOP (which letter shall be in a form reasonably satisfactory to Arnold & Porter, whose expenses for such review shall be borne by the Company).

SECTION 7.03. Public Announcements. Parent, Buyer and the Company will consult with each other before issuing any press release or making any public statement with respect to this Agreement and the transactions contemplated hereby and, except as may be required by applicable law or any listing agreement with any national securities exchange, will not issue any such press release or make any such public statement prior to such consultation.

SECTION 7.04. Further Assurances. At and after the Effective Time, the officers and directors of the Surviving Corporation will be authorized to execute and deliver, in the name and on behalf of the Company or Merger Subsidiary, any deeds, bills of sale, assignments or assurances and to take and do, in the name and on behalf of the Company or Merger Subsidiary, any other actions and things to vest, perfect or confirm of record or otherwise in the Surviving Corporation any and all right, title and interest in, to and under any of the rights, properties or assets of the Company acquired or to be acquired by the Surviving Corporation as a result of, or in connection with, the Merger.

ARTICLE VIII

CONDITIONS TO THE MERGER

SECTION 8.01. Conditions to the Obligations of Each Party. The obligations of the Company, Parent, Buyer and Merger Subsidiary to consummate the Merger are subject to the satisfaction of the following conditions:

(i) this Agreement shall have been adopted by the stockholders of the Company in accordance with the Delaware Law and the Company's certificate of incorporation and bylaws;

(ii) any applicable waiting period under the HSR Act relating to the Merger shall have expired;

(iii) no provision of any applicable law or regulation and no judgment, injunction, order or decree shall prohibit the consummation of the Merger;

(iv) an amended collective bargaining agreement between the Company and the USWA substantially on the terms and conditions set forth in Exhibit C hereto shall have become effective simultaneously with the execution and delivery of this Agreement;

(v) the Cash Bonus Plan of the Company shall have been amended and restated substantially in the form of Exhibit D hereto and shall have been duly adopted by all necessary action; and

(vi) the Old ESOP participants shall have voted to approve the termination of the Old ESOP in accordance with the terms and conditions thereof.

SECTION 8.02. Conditions to the Obligations of Parent, Buyer and Merger Subsidiary. The obligations of Parent, Buyer and Merger Subsidiary to consummate the Merger are subject to the satisfaction of the following further conditions:

(i) the Company shall have performed in all material respects all of its obligations hereunder required to be performed by it at or prior to the Effective Time, the representations and warranties of the Company contained in this Agreement and in any certificate or other writing delivered by the Company pursuant hereto shall be true in all material respects at and as of the Effective Time as if made at and as of such time and Parent and Buyer shall have received a certificate signed by the president of the Company to the foregoing effect (provided that such certificate may, as to representations and warranties, be limited to the best knowledge after due inquiry of the officer signing such certificate);

(ii) no court, arbitrator or governmental body, agency or official shall have issued any order, and there shall not be any statute, rule or regulation, restraining or prohibiting the consummation of the Merger or the effective operation of the business of the Company and its Subsidiary after the Effective Time, and no proceeding challenging this Agreement or the transactions contemplated hereby or seeking to prohibit, alter, prevent or materially delay the Merger shall have been instituted by any person before any court, arbitrator or governmental body, agency or official and be pending;

(iii) Parent and Buyer shall have received all documents they may reasonably request relating to the existence of the Company and its Subsidiary and the authority of the Company for this Agreement, all in form and substance reasonably satisfactory to Parent and Buyer;

(iv) all actions by or in respect of, or filings with, any governmental body, agency or official, or authority referred to pursuant to Section 4.03(a) or required to permit the consummation of the transactions contemplated by this Agreement shall have been taken, made or obtained and Parent and Buyer shall have received or be satisfied that they will receive evidence of all such actions;

(v) Parent and Buyer shall have received, or be satisfied that they will receive, any consents, approvals or waivers from third parties required to consummate the transactions contemplated by this Agreement;

(vi) Parent and Buyer shall have received opinions of counsel to the Company in the forms of Exhibits E and F hereto;

(vii) Parent and Buyer shall have received evidence satisfactory to them that the amended and restated Old ESOP substantially in the form of Exhibit K hereto has been duly adopted by the Company and the participants in the Old ESOP;

(viii) Parent and Buyer shall have received a report of John F. Abel, Jr. relating to the mining methods of the Company in form and substance reasonably satisfactory to Parent and Buyer;

(ix) Parent and Buyer shall have received a report of Environmental Resources Management, Inc. in form and substance reasonably satisfactory to Parent and Buyer;

(x) Parent and Buyer shall have obtained ALTA forms of owner's title insurance policies, or binders to issue the same, dated the Effective Date and in amounts satisfactory to Parent and Buyer insuring or committing to insure, at ordinary premium rates without requirement for additional premiums, good and marketable title to the Core Properties, except (a) the properties listed in Schedule 8.02 delivered by Parent and Buyer to the Company or (b) any other Core Properties that in the aggregate are not material, in the reasonable judgment of Parent and Buyer, to the Business being acquired, free and clear of any encumbrances except as permitted hereunder, which policies shall be supplemented by such endorsements as may be required by Parent and Buyer (including an endorsement to the effect that knowledge of the Company on or before the Effective Date shall not be imputed to the insured from and after the Effective Date);

(xi) Parent and Buyer shall have received and shall have had a reasonable opportunity to review, such other title searches, abstracts, title insurance commitments and mineral title opinions, and such estoppel certificates from Chemical Bank and each Lessor, licensor or dominant estate holder from which the Company leases, licenses or holds a royalty interest or profit a prendre in, mineral interests, as are necessary to verify the correctness of the representations and warranties contained in Section 3.10 and are available to the Company with the cooperation of Parent and Buyer and with the exercise of reasonable effort by the Effective Date;

(xii) the Trustee of the Old ESOP will simultaneously with the receipt of the Initial Consideration for the Merger repay the loan between the Company and the Old ESOP with a portion of such Initial Consideration;

(xiii) Parent and Buyer shall have received Certificates substantially in the form of Exhibit G hereto from each of Russell L. Wood, Michael D. Dunn and Herman Ponder;

(xiv) each of the Stock Agreements listed on Schedule 3.05 shall have been terminated;

(xv) the Company shall have applied for determination letters from the Internal Revenue Service with respect to the Copper Range Company 401(k) Savings Plan and the Copper Range Company 401(k) Hourly Employee Savings Plan that such plans are qualified under Section 401(a) of the Code; and

(xvi) Parent and Buyer shall have received an executed copy of the letter agreement on indemnity attached hereto as Exhibit N.

SECTION 8.03. Conditions to the Obligation of the Company. The obligation of the Company to consummate the Merger is subject to the satisfaction of the following further conditions:

(i) Parent, Buyer and Merger Subsidiary shall have performed in all material respects all of their obligations hereunder required to be performed by it at or prior to the Effective Time, the representations and warranties of Buyer and Merger Subsidiary contained in this Agreement and in any certificate or other writing delivered by Parent or Buyer pursuant hereto shall be true in all respects at and as of the Effective Time as if made at and as of such time and the Company shall have received a certificate signed by an officer of Buyer to the foregoing effect;

(ii) the Company shall have received all documents it may reasonably request relating to the existence of Parent and Buyer and their corporate authority for this Agreement, all in form and substance satisfactory to the Company;

(iii) all actions by or in respect of, or filings with, any governmental body, agency or official, or authority referred to pursuant to Section 3.03(a) or required to permit the consummation of the transactions contemplated by this Agreement shall have been taken, made or obtained and the Company shall have received or be satisfied that they will receive evidence of all such actions;

(iv) the Company shall have received an opinion of counsel to Buyer in the form of Exhibit H hereto;

(v) the Company shall have received an opinion of counsel to Parent in the form of Exhibit I hereto;

(vi) the partial contribution due from the Surviving Corporation for the year ending December 31, 1989 pursuant to Section 4(d) of the New ESOP shall have been made;

(vii) the Company shall have received an executed copy of the letter agreement on voting attached hereto as Exhibit L; and

(viii) the Company shall have received an executed copy of the letter agreement on notice of proposed sale attached hereto as Exhibit M.

ARTICLE IX

TERMINATION

SECTION 9.01. Termination. This Agreement may be terminated and the Merger may be abandoned at any time prior to the Effective Time (notwithstanding any approval of this Agreement by the stockholders of the Company):

(i) by mutual written consent of the Company, Parent and Buyer;

(ii) by either the Company, Parent or Buyer, if the Merger has not been consummated by June 7, 1989;

(iii) by either the Company, Parent or Buyer, if there shall be any law or regulation that makes consummation of the Merger illegal or otherwise prohibited or if any judgment, injunction, order or decree enjoining Buyer, Parent or the Company from consummating the Merger is entered and such judgment, injunction, order or decree shall become final and nonappealable;

(iv) by Parent and Buyer, if any change has occurred since the Balance Sheet Date which has caused, or is reasonably likely to cause, a Material Adverse Effect, other than an event that has resulted in or is reasonably likely to cause any change in the present or anticipated price of copper, silver or any other metal, which change has caused or is reasonably likely to cause a Material Adverse Effect;

(v) by Parent and Buyer, upon the occurrence of any Trigger Event described in clauses (i) through (iv) of Section 10.04(b);

(vi) by Parent and Buyer, if there has been a material misrepresentation or breach of warranty on the part of the Company in the material representations and warranties contained herein; or

(vii) subject to the payment provided for in Section 10.04(c), by Parent and Buyer in their sole discretion for any other reason whatsoever.

SECTION 9.02. Effect of Termination. If this Agreement is terminated pursuant to Section 9.01, this Agreement shall become void and of no effect with no liability on the part of any party hereto, except that the representations, warranties and agreements contained in Sections 3.20, 4.05, 5.06, 6.01 and 10.04 shall survive the termination hereof.

ARTICLE X

MISCELLANEOUS

SECTION 10.01. Notices. All notices, requests and other communications to any party hereunder shall be in writing (including facsimile, telex or similar writing) and shall be given, if to Parent, Buyer or Merger Subsidiary, to:

Klaus M. Zeitler
Suite 2812, Toronto Dominion Bank Tower
P.O. Box 19, Toronto-Dominion Centre
Toronto, Ontario M5K 1A1
Facsimile: (416) 368-3710

with a copy to: Winthrop B. Conrad, Jr.
Davis Polk & Wardwell
1 Chase Manhattan Plaza
New York, New York 10005
Facsimile: (212) 530-4800
Telex: ITT-421341; and

if to the Company, to:

Russell L. Wood
Copper Range Company
P.O. Box 100
White Pine, Michigan 49971
Facsimile: (906) 885-5437

with a copy to:

Catherine Collins McCoy
Arnold & Porter
1200 New Hampshire Avenue, N.W.
Washington, D.C. 20036
Facsimile: (202) 872-6720
Telex: 89-2733

or such other address or facsimile or telex number as such party may hereafter specify for the purpose by notice to the other parties hereto. Each such notice, request or other communication shall be effective (i) if given by telex, when such telex is transmitted to the telex number specified in this Section 10.01 and the appropriate answerback is received or (ii) if given by any other means, when delivered at the address specified in this Section.

SECTION 10.02. Survival of Representations and Warranties. The representations and warranties and agreements contained herein and in any certificate or other writing delivered pursuant hereto shall not survive the Effective Time except for the representations, warranties and agreements set forth in Article I and Sections 6.03, 6.04, 6.06, 7.02(iv), 7.04 and 10.04.

SECTION 10.03. Amendments; No Waivers. (a) Any provision of this Agreement may be amended or waived prior to the Effective Time if, and only if, such amendment or waiver is in writing and signed, in the case of an amendment, by the Company, Parent, Buyer and Merger Subsidiary or in the case of a waiver, by the party against whom the waiver is to be effective; provided that after the adoption of this Agreement by the stockholders of the Company, no such amendment or waiver shall, without the further approval of such stockholders, alter or change (i) the amount or kind of consideration to be received in exchange for any shares of capital stock of the Company, (ii) any term of the certificate of incorporation of the Surviving Corporation or (iii) any of the terms or conditions of this Agreement if such alteration or change would adversely affect the holders of any shares of capital stock of the Company.

(b) No failure or delay by any party in exercising any right, power or privilege hereunder shall operate as a waiver thereof nor shall any single or partial exercise thereof preclude any other or further exercise thereof or the exercise of any other right, power or privilege. The rights and remedies herein provided shall be cumulative and not exclusive of any rights or remedies provided by law.

SECTION 10.04. Expenses and Termination Fees. (a) Except as otherwise provided in this Section, all costs and expenses incurred in connection with this Agreement shall be paid by the party incurring such cost or expense.

(b) The Company agrees to pay Buyer a fee in immediately available funds equal to $5,000,000 promptly, but in no event later than two business days, after the termination of this Agreement as a result of the occurrence of any of the events set forth below (a "Trigger Event"):

(i) the Company shall have entered into, or shall have publicly announced its intention to enter into, an agreement or an agreement in principle with respect to any Acquisition Proposal;

(ii) any person or group (as defined in Section 13(d)(3) of the Securities Exchange Act of 1934, as amended) (other than Buyer or any of its affiliates or, in the case of an acquisition of Shares, any group of current shareholders of the

Company listed on Schedule 3.05) shall have become the beneficial owner (as defined in Rule 13d-3 promulgated under the 1934 Act) of at least 25% of the outstanding Shares or shall have acquired, directly or indirectly, at least 25% of the assets of the Company;

(iii) the Company or its Subsidiary shall have known that any material representation or warranty made by the Company in, or pursuant to, this Agreement shall not have been true and correct in all material respects when made, or the Company shall have failed to observe or perform in any material respect any of its material obligations under this Agreement; or

(iv) the Board of Directors of the Company shall have withdrawn or materially modified its approval or recommendation of the Merger or this Agreement.

Such payment shall constitute the exclusive remedy of Parent, Buyer and Merger Subsidiary if a Trigger Event shall occur.

(c) Buyer agrees to pay the Company a fee in immediately available funds equal to $5,000,000 promptly, but in no event later than two business days, after the termination of this Agreement pursuant to clause (vii) of Section 9.01. Such payment shall constitute the Company's exclusive remedy for any such termination.

(d) If the Merger is consummated, the Company shall assume and pay, or reimburse Buyer for, all reasonable fees payable and expenses incurred by Parent and Buyer (including the fees and expenses of its counsel and the fees and expenses of institutions that are considering making or have made a commitment to provide financing for the transactions contemplated hereby) in connection with this Agreement and the transactions contemplated hereby.

SECTION 10.05. Successors and Assigns. The provisions of this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns, provided that no party may assign, delegate or otherwise transfer any of its rights or obligations under this Agreement without the consent of the other parties hereto.

SECTION 10.06. Governing Law. This Agreement shall be construed in accordance with and governed by the law of the State of Delaware.

SECTION 10.07. Counterparts; Effectiveness. This Agreement may be signed in any number of counterparts, each of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument. This Agreement shall become effective when each party hereto shall have received counterparts hereof signed by all of the other parties hereto.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed by their respective authorized officers as of the day and year first above written.

COPPER RANGE COMPANY

ATTEST:

By: /s/ Russell L. Wood
Title: President

/s/ Richard F. Mauro
Title: Asst. Secretary

METALL MINING CORPORATION

By: /s/ Klaus Zeitler
Title: President

MMC HOLDINGS INC.

By: /s/ Klaus Zeitler
Title: President

CRC ACQUISITION COMPANY

ATTEST:

By: /s/ Klaus Zeitler
Title: President

/s/ Richard J. Balfour
Title: Secretary

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Directors - ok
Officers ? Title - President

Oct 2002

UNANIMOUS WRITTEN CONSENT
RESOLUTIONS OF
THE BOARD OF DIRECTORS
OF
COPPER RANGE COMPANY

The undersigned, constituting all of the members of the board of directors (the "Board of Directors") of Copper Range Company, a Delaware corporation (the "Corporation"), acting pursuant to Section 141(f) of the General Corporation Law of Delaware, hereby adopt the following resolutions and take the following actions without a meeting by written consent of the Board of Directors of the Corporation:

Contribution to Capital

WHEREAS, the Corporation has two classes of stock, common stock (the "Common Stock") and the Class A Stock;

WHEREAS, MMC Holdings, Inc. ("MMC Holdings") owned 100% of the Common Stock of the Corporation;

WHEREAS, MMC Holdings was a wholly-owned subsidiary of Inmet Mining Corporation ("Inmet");

WHEREAS, during the period that MMC Holdings owned 100% of the Common Stock of the Corporation, MMC Holdings advanced the Corporation loans in the aggregate amount of $151,891,112 (the "Aggregate Principal Amount");

WHEREAS, the Corporation accrued, but has not paid, interest payable to MMC Holdings on the Aggregate Principal Amount (the "Aggregate Accrued Interest"), which Aggregate Accrued Interest was $126,714,249 on __________, 2002;

WHEREAS, on December 20, 2000, MMC Holdings completely liquidated into Inmet (the "Liquidation");

WHEREAS, as a consequence of the Liquidation, all of the assets of MMC Holdings, including the Common Stock, the Aggregate Principal Amount and the Aggregate Accrued Interest, were transferred to the Corporation and, as a result, the Corporation owns 100% of the Common Stock of the Corporation;

WHEREAS, Inmet desires to contribute the Aggregate Principal Amount and the Aggregate Accrued Interest (collectively, the "Additional Contributed Capital") to the capital of the Corporation as additional paid-in surplus with respect to the

Common Stock, without the receipt of additional shares of stock of the Corporation;

NOW THEREFORE, BE IT RESOLVED, that as of the date hereof (the "Effective Date"), the Additional Contributed Capital shall be contributed to, and constitute part of, the additional paid-in surplus with respect to the Common Stock;

FURTHER RESOLVED, that, upon the Effective Date, the President of the Corporation shall be and hereby is authorized, empowered and directed (either alone or in conjunction with any one or more of the other officers of the Corporation) to take, from time to time, all actions on or in behalf of the Corporation as he shall deem necessary or advisable in order to carry out the intent of these resolutions;

General Matters

FURTHER RESOLVED, that the proper officers of the Corporation be and hereby are authorized and directed to execute and deliver any and all documents necessary to effectuate the intent of the foregoing resolutions, the execution of such documents by such officers being a definitive determination of the necessity and appropriateness thereof, and further, that such officers are hereby authorized to do any and all such acts and deeds as they or legal counsel for the Corporation deem appropriate or necessary to effectuate the intent of these resolutions; and

FINALLY RESOLVED, that all acts and deeds heretofore done by any director, officer or officers of the Corporation for and on behalf of the Corporation in entering into, executing, acknowledging or attesting any arrangements, agreements, instruments or documents, or in carrying out the terms and intentions of these resolutions, are hereby ratified, approved and confirmed.

This Consent of Directors shall be effective as of October ___, 2002.

DIRECTORS:

____
John Haapala

____
Darrell Malnar

____
Joel Vattendahl

____
Jochen Tilk

____
Richard Ross

____
Jo-Anne Oswald

____
Craig Ford